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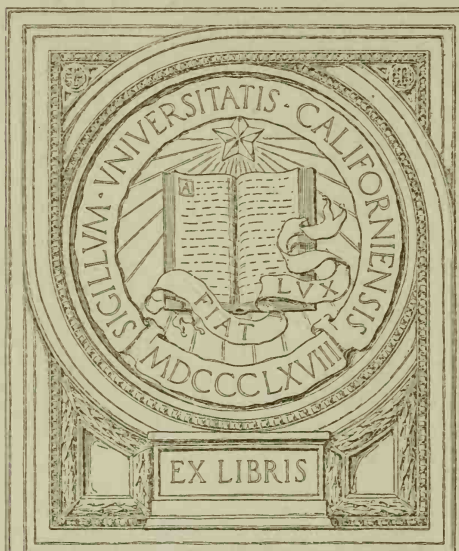

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The only real wealth is health.

—

The great hope of modern medicine is the prevention of disease.—*Cabot*

THE
PREVENTION OF DISEASE

A POPULAR TREATISE

BY

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TO

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IN APPRECIATION OF CONSTANT
ENCOURAGEMENT AND SYMPATHY
IN THE WRITING OF THIS BOOK

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PREFACE

"An ounce of prevention is worth a pound of cure" is a truly weighty maxim, and expresses fairly accurately the comparative ratio of value between curative and preventive medicine, *i. e.*, as 16 to 1. Modern preventive medicine may be said to have begun with Sir Edward Jenner (1796), who introduced vaccination against smallpox. This was founded solely upon the experience of the laity, and a whole century elapsed before another Englishman, Sir Almoth Wright (1897), was enabled, through advances in knowledge and his own genius, to re-introduce vaccination as a general method of protection in various germ diseases. At one stroke he annihilated the dangers of a disease (typhoid fever) whose bacilli are more fatal than bullets and placed it in the growing list of preventable disorders.

The meaning of vaccination has been amplified, and while originally signifying inoculation with a cow (vacca) virus, the term may now be properly applied to the use of any material for preventive inoculation.

But this book is not a record of the progress in preventive medicine.

It is a detailed practical guide for the layman that he may avoid the various diseases described herein. The

first three chapters are devoted to the proper methods of living in health so as to evade ill health.

These pages contain the essence of matters to which whole books are often dedicated. The matter on diet, exercise, tea and coffee, and alcohol the author believes will prove of special interest and worth.

While the secret of cancer remains to be solved, yet recent knowledge may enable an individual to escape this most dreaded and fatal malady. In fact, the importance of this matter is so great that its discussion alone should make a book of this kind worth while.

In relation to the germ diseases, the common methods are considered whereby one may protect oneself or others. The means of preventing malaria, colds, and the proper diet and exercise in the prevention of constipation and obesity should appeal to a large number of persons. The prevention of nervous disorders in children of neurotic parents has a large field of usefulness in this country. The very recent work of Billings and Rosenow in Chicago, emphasizing the influence of diseased tonsils, gums and teeth, and other local infections in the production of the most serious chronic diseases, has been deemed worthy of a special chapter. The use of a new instrument of precision in the last decade for estimating blood-pressure has greatly enlarged our knowledge of arterial disease, or premature old age, and a chapter is devoted to this subject. Prevention of the diseases of childhood is perhaps the most essential subject in preventive medicine, and a chapter will be found on this topic.

The knowledge that infant mortality results chiefly from the feeding of raw cows' milk has enormous significance. While there is no specific for the prevention of tuberculosis, yet we believe that the practical points given in this connection will be found of much service.

The prevention of sexual diseases is a subject equally disagreeable and vital, and the ostrich-like fashion of ignoring its existence is both absurd and reprehensible.

The author wishes to express his sincere appreciation and hearty thanks for the kindness and generosity of some of the foremost medical men in America who have gratuitously contributed the introductory notes to be found in various parts of this book.

This they did to show the laity that the matter contained herein represents the sound and scientific opinion of the leaders of the medical profession today.

These leaders would be unwilling to lend their distinguished names if they did not believe that the book would aid in bettering the lives of its readers.

This book is not merely a compilation from literature, but is the outcome of a quarter-century of active medical and surgical practice in the East and West.

KENELM WINSLOW.

SEATTLE, WASHINGTON,
November, 1916.

FOREWORD

It is very pleasing to find placed before the people such a concise and simple description of most of the facts known to modern preventive medicine as that given in the following pages.

For too long a period medicine has been looked upon as more or less associated with mystery, and for this reason all sorts of mysteries have crept into it through many cults and isms, and many practices and pathies.

Such training in medicine as it has been possible for the public to receive has often been obtained from the direct advertising or faked medical news items in the papers and magazines of the day.

Never before has there been such a general appreciation of preventive medicine as now. The present war has shown the possibilities of protecting whole armies from the ravages of disease.

By the prevention of disease great enterprises which were impossible twenty years ago, such as the building of the Panama Canal, are now possible.

During the last half century the average duration of human life has been increased many years, largely through the protection of the people by public health laws.

The presentation of the wonderful advances of modern medicine here given, together with carefully considered rules for daily living in order to preserve health, is offered to those who desire them, not that they may become physicians by reading this matter, but that, from their wider knowledge of science, they may be better citizens.

CHARLES H. MAYO.

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THE PREVENTION OF DISEASE

CHAPTER I

PERSONAL HYGIENE

Tea, Coffee, Alcohol, Tobacco, Morphin, and Cocain

TEA AND COFFEE

It is a singular and noteworthy fact that there appears to be some instinctive demand or craving among human kind for caffein. All over the world natives have discovered and habitually drink beverages containing this active principle, although the plants have no common resemblance and the effects produced are not marked, as in the cases of alcohol, opium, and hashish.

Thus, tea, coffee, chocolate, and cocoa all contain caffein or allied bodies—thein and theobromin. Caffein is also the active principle of the African kola nut, of the South American guarana and maté tea (from a species of holly), while in the West Indies and Mexico the habitual beverage is made from the fermented chocolate bean.

Caffein is one of the most powerful heart and nervous stimulants employed in medicine. A cup of coffee contains from $1\frac{1}{2}$ to 3 grains of this substance, a full medicinal dose. Tea contains 1 to 4 per cent.; coffee, 0.6 to 2 per cent.; maté, 1.3 per cent.; kola, 1 to 2 per cent.; guarana, 3 to 6 per cent. of caffein.

In the roasting of coffee there is developed a volatile oil, caffeol, to which the flavor and aroma is due. It is so

powerful that one drop of caffeol will fill a room with coffee odor.

Tea naturally contains a volatile oil (0.6 per cent.). Both tea and coffee have a considerable amount of tannic acid in their composition, but that in coffee is comparatively inert, although it tends to impair digestion somewhat. That in tea, however, is active and astringent, and exerts a tanning effect upon the mucous membrane of the stomach in strong solutions. Neither coffee nor tea should be boiled in their preparation, since the volatile oil, or flavor and aroma, are considerably lost in the process. Coffee should be made by percolation with boiling water, or by enclosing coffee in a tea-ball and pouring boiling water over it and allowing it to steep for a few minutes. Tea is commonly made in this fashion and is permitted to steep from two to five minutes.

The longer tea stands the darker it gets and the more tannic acid it contains. The confirmed tea drinker, who keeps the tea standing in the teapot all day and drinks it cold, is getting enough tannin to convert hide into leather. There are but 1 to 2 grains of caffein in a cup of tea, as less tea than coffee is used to the cup.

The volatile oil in *coffee* stimulates the brain, the stomach and bowels, and in some persons acts favorably as a laxative. In others, coffee causes overacidity in the stomach and diarrhea owing to this action. The oil in coffee (said to be about a teaspoonful in a cup) is probably one reason for "biliousness" which it induces in some individuals, but this is partly due to the large amount of caffeotannin in coffee. Strong tea, through its active tannin, on the other hand, lessens acidity in the stomach and favors constipation, although more immediately stimulating to the brain than coffee. In nervous indigestion and nervous conditions generally both tea and coffee

are injurious because of the exciting action of caffein on the nervous system. It is a curious fact that after drinking many cups of tea or coffee daily for months or years a person may become suddenly oversusceptible to their influence, so that a single cup may cause bad effects. The same phenomenon is seen in the case of tobacco users. It is a matter of common knowledge that whereas one person may drink several cups of tea or coffee without disturbing sleep, in another a single cup hours before bedtime may keep him wide awake and restless with active mind most of the night.

The action of preparations of *kola* sold at the soda-water fountains depends upon caffein, and the kola habit is more prevalent in the South.

Chocolate contains 0.3 to 2 per cent. of theobromin and up to $\frac{1}{3}$ of 1 per cent. of caffein.

Chocolate is very rich in fat (30 to 50 per cent.) or cacao-butter. In cocoa we have the fat much reduced (15 to 30 per cent.) by its removal through hydraulic pressure.

The active principle of chocolate (theobromin) is much less stimulating to the brain than caffein, but has a more powerful action on the kidneys. Chocolate is extremely nourishing, but the amount of fat and sugar in it retards the secretion of gastric juice and the motions of the stomach, while its theobromin is apt to cause loss of appetite. Cocoa is less prone to disturb digestion by containing less fat, while the cheaper kinds are mixed with starch, and so hold less theobromin. Some cocoas have the fat in a more digestible form by treating them with an alkali by the Dutch process. Phillips' digestible cocoa is especially suited for those with weak digestions. While cocoa is a valuable and very nutritious beverage for the invalid, chocolate is too rich and sweet to be digestible. A heaping

teaspoonful of cocoa and sugar added to milk nearly doubles its food value. Cocoa should be boiled five minutes to cook the raw starch (10 per cent.). It also contains about 15 per cent. of protein.

Action.—Now as to the general physiologic action of the caffein-containing beverages: Caffein is an active stimulant to the brain, heart, and muscles.

It enables persons under its influence to do more and better mental work. It increases the perception and association of ideas and the acuteness of the senses, as the sense of touch. In thus sharpening the intellect caffein is directly opposed to alcohol. It more nearly resembles strychnin in action, and in poisonous doses renders the nervous system so acute to stimulation that a touch on the skin may throw an animal into convulsions. It has been found experimentally that stenographers will do more, better, and speedier work after one cup of coffee than without any, and fatigue does not follow the extra work. Larger doses of caffein retard the speed, but do not impair the quality of the work. Many experiments have shown that soldiers march longer without fatigue under the influence of caffein or coffee. It stimulates the muscles directly as well as the nervous system. For any especial mental effort, as in taking an examination, coffee in moderate amount (one or two cups) will enable one to do better work, but the continued use of it for night-study only leads to nervousness and mental confusion.

The bad effects of the tea and coffee habit are seen especially in nervous, sedentary, underfed, anemic, and debilitated persons. The symptoms include insomnia, trembling of the hands, palpitation of the heart, noises in the ears or head, pain in the stomach or heart-burn, rapid, irregular pulse, neuralgia and headaches, general nervousness, and (from tea) constipation. Poor and underfed

women are specially prone to the tea habit. In all cases of insomnia, dyspepsia, and nervousness the first thought should be to stop the use of coffee and tea.

Caffein is used in medicine chiefly as a rapidly acting heart stimulant, often injected under the skin, and also to stimulate the action of the kidneys.

The habitual use of tea and coffee, like that of tobacco, does not improve the health. A single cup of either taken daily will not perceptibly injure the health of most normal persons. Used to excess and by susceptible persons the harm done by tea and coffee is immense. The race would be better off without either, and the young should be discouraged from initiating the habit.

ALCOHOL

The action of alcoholic drinks depends chiefly upon the amount of alcohol they contain. Ale, stout, beer, and porter contain from 3 to 7 per cent. of alcohol. The bitter they hold (hops) tends to improve the appetite, but the sugar and starchy matter may cause gas in the bowels. The older and darker foreign beers appear to produce much less of this fermentation in the bowels and are less apt to cause "biliousness" and indigestion.

The lighter wines contain from 7 to 15 per cent. of alcohol, more often 12 to 14 per cent., as California clarets, Madeira, muscatel, sherry and Riesling, and the Rhine and Hungarian wines.

The yeast plant, which produces wine by the fermentation of saccharine grape juices, is itself killed by an amount of alcohol much over 15 per cent., and so the stronger wines are fortified—that is, have alcohol added to them in the form of distilled liquor from grapes, figs, raisins, or sweet potatoes.

The fortified wines are imported sherry, port, and Ma-

deira, and contain from 17 to 25, or even 30 per cent., of alcohol.

Champagne is considered one of the most stimulating wines, and yet contains but about 10 per cent. of alcohol. It, like some kinds of Burgundy, is called a sparkling wine on account of being charged with carbonic acid gas.

It stimulates the stomach and its effect is much more rapid, for the reason that it reflexly stimulates the heart (through stimulation of the stomach), and by increasing the blood-supply and movements of the stomach leads to more rapid absorption. Somewhat the same effect is seen when whisky is mixed with soda water.

The bouquet of wines is due to the development of special alcohols, or esters, by long standing. A red wine is prepared by fermentation of the juice of red grapes with their skins. If it contains much tannin it is said to be rough. White wines, as Sauterne, Chablis, Riesling, are made from grapes freed from seeds, skins and stems, and usually contain no tannic acid. A dry wine contains little sugar, it having been all fermented into alcohol, while a sweet wine contains free sugar.

Distilled liquors or spirits are made by distilling any fermented liquor. Alcohols, volatile acids, and ethers are found in distilled liquors. Distilled liquors should age (over four years) in order that the bouquet may develop from the action of the acid on the alcohol and form esters. Also that the fusel oil may escape, which causes the after-headache from new whisky. Distilled liquors are made from fermented grains (corn, rye, wheat, barley), as whisky and gin, and from fermented fruit juices, as brandies. Ordinary brandy or Cognac is distilled from wine; and peach, pear, and apple brandy from fermented juice of these fruits. The distilled liquors contain from 45 to 55 per cent. of alcohol. Rum is distilled from fer-

mented molasses. Scotch and Irish whisky have a smoky taste from being distilled over peat fires, or from being made from malt dried over peat fires. Gin is distilled from fermented rye, and then redistilled with juniper berries, which makes it more useful in relieving pain, and it is much used by women for this purpose during menstruation.

Cordials are artificial mixtures of aromatics, sugar, alcohol, and water. They contain from 50 per cent. (Chartreuse) to 67 per cent. of alcohol (absinthe) and over 30 per cent. of sugar. Absinthe has a peculiarly bad effect upon the brain, causing mental depression, convulsions, and insanity in habitués. Many countries forbid its manufacture, and the United States its importation since 1912. The great amount of sugar and alcohol in cordials produces a very injurious action on the stomach.

Experimental researches concerning alcohol have quite altered the attitude of the medical profession toward it during the last decades. As a direct consequence, its use in treatment of disease is as rare today as it was formerly common. Our knowledge and ideas have changed, particularly in reference to the so-called stimulant effect of alcohol and its action as a food.

By stimulant action one may refer to stimulation of the nervous system or circulation.

Action of Alcohol.—We will first consider the action of alcohol on the nervous system. We now know that alcohol, instead of being a stimulant, is a powerful depressant or narcotic (producing stupor) to the nervous system, beginning with depression of the most highly developed functions of the brain and continuing until there is loss of consciousness, motion, sensation, and even paralysis of the first-formed (in course of evolution) and most vital centers at the base of the brain, so that we have failure of respira-

tion and circulation in alcoholic poisoning, or drunkenness. In fact, alcohol acts like ether, only its action is much slower, because it has to be absorbed from the stomach instead of being absorbed in the form of vapor by the lungs.

It is a well-known physiologic fact that the functions of the brain which have most recently developed in the evolutionary course of ages are the first to succumb to the action of drugs. Alcohol decreases or depresses the higher brain functions of will, self-control, reason and judgment, and sets us back on the animal plane. This is seen in the conduct of one under the influence of alcohol, when modesty is lost, demeanor and speech become free and uncontrolled (*in vino veritas*), and the subject is thoughtless of others, is reckless, oversanguine and confident, and deficient in reasoning power and judgment.

The false feeling of stimulation comes from the more ready effect of outside stimuli, as through mental excitement produced by social intercourse, the warmth of the skin and stomach, and enhanced emotional and imaginative functions. In many persons, especially when alone, and in animals alcohol only produces depression, dulness, and stupor from the start, and is frequently used for this reason to overcome sleeplessness.

The depression of the higher brain centers by alcohol is also seen in the impairment of sight, hearing, and touch, although the subject feels that the contrary is true. Typesetters make more errors, musicians strike more false notes under alcohol. On the other hand, muscular power is increased for a short time (up to half an hour) by alcohol, but later there is a corresponding loss of strength—as great as 50 per cent. sometimes. For sustained effort alcohol is inadvisable. Soldiers endure longer on the march without it, and the Germans have found that sugar or chocolate is superior.

The removal of abnormal constraint and self-consciousness by alcohol may be of advantage to public speakers, in allowing greater freedom of speech and gestures, and in giving the musician greater power of emotional expression and abandon. But the danger of overstepping the mark and producing stupefaction, and the greater peril of forming an unconquerable habit, make such use of alcohol unwise.

In removing the normal restraint exercised by the brain over the sexual desires alcohol is the chief means of leading youth into immorality. This it does in two ways—first, by diminishing the will power, and, second, by increasing the animal desires—hence, "weib" is the natural corollary of "wein" ("wein, weib, und gesang").

The word "stimulant" is almost synonymous with alcohol in the popular mind. In reference to the circulation, alcohol in concentration (as when whisky or brandy are given with an equal amount of water) stimulates the heart by irritating the mouth and throat. This stimulation is marked, yet lasts but a few moments. After the alcohol is absorbed it has very slight stimulating effect on the heart.

Alcohol is no longer habitually employed as a heart stimulant in fevers, exhausting disease, and conditions of acute heart weakness (pneumonia), but is one of the best agents for use by the layman in emergencies, for its fleeting, stimulant action in faintness, after emotional and nervous shocks, and after accidents. But do not give such an amount as to depress and intoxicate the patient, as only too frequently results from the overwillingness of the anxious layman. Two to four tablespoonfuls of whisky or brandy, with an equal amount of water, constitute a suitable dose.

The action of alcohol in imparting a sensation of warmth

to the skin, stomach, and face gives one a false sense of its stimulating effect. This is not stimulation, but dilatation of the blood-vessels. So far from being an evidence of stimulation, relaxation of the vessels results in fainting from lack of blood in the brain, if excessive. The injurious action of alcohol in those exposed to cold is accounted for by its influence on the blood-vessels. The lowest temperatures ever seen in the human body have occurred in intoxicated persons exposed to cold. Alcohol is tabooed in Arctic exploration on this account. By dilating the blood-vessels of the skin alcohol permits of the largest amount of cooling of the blood by external cold.

There is the now classic example of the effect of alcohol upon an Alpine party, spending the night at a high altitude after a hard day's climb, related by Brunton. Some of the party refused alcohol and turned in cold and miserable; others drank whisky in moderation, and retired feeling warmer and more comfortable; while the remainder partook freely and slept oblivious to all hardship. In the morning those who had refrained from alcohol awoke refreshed and well, those who had taken a small amount of alcohol found themselves cold and wretched, while those who had indulged freely did not awake at all because they were dead.

The only time that alcohol is indicated in such cases is after the exposure to cold is past and when one enters a warm house or bed.

Then one may overcome the chilliness by a glass of hot water and whisky, and perhaps prevent "taking cold" by dilating the vessels on the surface of the body, thus restoring the circulation to normal or equalizing the circulation.

Alcohol has been truthfully called both a food and a poison—usually by opposing advocates. It is both. It

may take the place of starch and fat as a nutrient by supplying energy in its combusion in the body, but without requiring any digestive action of the stomach. Thus, in states of severe exhaustion or disease, or following great muscular or nervous strain, and in the aged it may be used to advantage as a food.

In continued fevers alcohol is employed for this purpose and for its narcotic action in allaying nervousness, restlessness, and in promoting sleep.

Alcohol excites the appetite and enables one to eat more than is good for him. It does not affect digestion notably, unless in the case of strong alcoholic liquors, which increase the acid of the gastric juice and favor the occurrence of gastric catarrh. The starchy matters in malt liquors and acids in some wines may retard digestion. The continuous use of alcohol as a beverage must be condemned from the food viewpoint because it destroys the vital organs, produces chronic inflammation of the stomach, and tends toward dulness and lessened capacity for muscular or mental work and results in a vicious habit. So it is probable that those who call alcohol a poison are nearer the truth than those who affirm it to be a food.

It is a common experience among humans, and is as frequently seen in experiments upon rabbits, that some individuals may drink large quantities of alcohol for years without inducing perceptible deterioration of their vital organs.

Others soon break down with various disorders—fatty degeneration of the heart, liver, and kidneys, hardening of the liver (cirrhosis) and arteries, Bright's disease of the kidneys in some cases, and chronic catarrh of the stomach. Inflammation and degeneration of the nervous system are common—meningitis, neuritis (inflammation of the surface of the brain and nerves), and hardening of the brain and

spinal cord. Great nervousness, insomnia, digestive disturbance, or pain in the legs or elsewhere (neuritis) are the symptoms which bring the drinker to the doctor.

To realize most poignantly the enormous number of persons wrecked by alcohol one should be attending physician at a large city hospital.

The ordinary well-to-do and well-behaved individual has no means of appreciating the true significance of drink. Daily to see innumerable patients with delirium tremens and its immediate sequel ("wet brain") in the more inveterate cases, with death or insanity resulting as a matter of course, has a most impressive influence upon the least thoughtful. The insane asylum is another splendid place to view the end-results of alcohol in the subject or his progeny. Alcohol renders persons less resistant to infections, notably consumption and pneumonia. The latter is also a peculiarly fatal disorder in the alcoholic.

While scientists may differ as to many details concerning alcohol, there are some basic facts upon which all are agreed. These are as follows: That alcohol is not of benefit to any healthy person under normal conditions. That the habitual use of a moderate amount of alcohol, or the occasional use of an excessive quantity of alcohol, is damaging to the health of normal individuals. That while the moderate and occasional employment of alcohol by most persons will produce no visible harm, in others there is such an inherent and inborn demand for alcohol that it is impossible for them to take it in moderation, and an incurable habit results. While technically a food, its intrinsic harmfulness is so great that alcohol may with propriety be termed a poison. It is especially damaging to women and children, though it may be of positive benefit to the aged. As a stimulant, alcohol may be used to advantage for its immediate effect in reflexly stimulating the

heart in emergencies (through its irritation of the mouth and throat before absorption). Its use as a stimulant after absorption from the stomach has been given up because such action does not exist to any extent. It is not a stimulant, but a stupifier of the nervous system, and its medicinal influence in this direction is taken advantage of for the production of sleep and quieting nervous excitement and restlessness. Its frequent use for any reason is dangerous in establishing a vicious habit.

Perhaps one of the most impressive statements concerning the effect of a moderate use of alcohol is found in that made by the actuary of the New York Life Insurance Co., who affirms that among the deaths of 2,000,000 policyholders during a period of twenty-five years the "total abstainers have a mortality during the working years of life of about one-half that among those who use alcohol to the extent of at least two glasses of whisky daily."

The world-wide prohibition movement depends upon the exact knowledge of alcohol derived from the experiments and experience of the medical profession, and its altered attitude in respect to the use of alcohol, more than upon any other factor.

TOBACCO

Tobacco is essentially a narcotic. In large amounts narcotics (as bromids, opium, alcohol) produce stupor and unconsciousness, but in small doses are sedative and soothing. Thus it is with tobacco. The narcotic influence is exerted upon the brain. The action of tobacco upon the circulation consists first in slowing and strengthening the heart and contracting the blood-vessels, but this effect is soon followed by depression and increased frequency of the heart and dilatation of the blood-vessels. After action comes reaction, and long after the influence of tobacco just

described has worn off there is a period of nervous irritability and instability.

This is the "morning after" phenomenon, as seen following excessive smoking, more especially when the habit is suddenly stopped.

The ill effects of the abuse of tobacco are well established and are briefly as follows: (1) Disturbance of the circulation. This is more commonly evidenced by pain about the heart and a feeling of fluttering or beating in this region, with shortness of breath on exertion and rapid, irregular pulse. In some cases the pulse may be slow and the blood-pressure unusually low. (2) Disturbance of the nervous system. Headaches, dizziness, and a tremulous condition of the hands are often observed. Lack of energy and ambition, together with nervous irritability and mental depression, result from overuse of tobacco. (3) Various forms of indigestion may be occasioned by excessive smoking, particularly that accompanied by increased acidity in the stomach and heart-burn. (4) The paralyzing action on special nerves. This is occasionally seen in partial blindness or deafness, owing to the direct action of nicotin upon the optic or auditory nerves. In this form of blindness the patient can see better in a dim light. (5) Local action of tobacco smoke. Tobacco smoke irritates the throat and also the eustachian tubes, which connect the upper part of the throat with the middle ear. In this way deafness from catarrh of the middle ear is not infrequently produced by excessive smoking.

Cigarette smokers have often a loud, ringing or barking, dry cough, with harshness or hoarseness of voice from the effects of the smoke upon the vocal cords. Then, in so-called "smoker's tongue" there are formed white patches (leukoplakia) not only on the tongue, but also upon the inside of the cheeks in some cases. One of these patches

is very prone to become cancerous after years unless smoking is stopped and treatment begun. Cancer of the lower lip, seen almost wholly in men, is thought to be due to pressure of a pipe-stem. Of course, it goes without saying that these troubles are not frequent occurrences in individual smokers, or the habit would soon lose favor, but, in the aggregate, there are great numbers of such cases. One can never tell where the lightning will strike. The disorders caused by tobacco are usually cured by complete abstention from its use, and by living in a healthy manner, with plenty of outdoor exercise and sleep.

But, since these troubles may also be attributed to other causes, it will be impossible for a doctor to be sure that tobacco is the source of any disorder until after complete abstention from the weed for weeks.

There are still other serious physical and moral dangers threatening the young who use tobacco. In a study of the students at Yale and Amherst it has been found that smokers are stunted in height, weight, and chest measure as compared to non-smoking students. Meylan, at Columbia, concluded from a careful investigation that the use of tobacco among the students leads to idleness, lack of application, ambition, and scholarship.

Charles B. Towns, who is the most celebrated specialist in drug habits in this country, insists that the harm done by tobacco is greater in the aggregate than that from alcohol, cocain and opium, and that "nothing else at the present time is contributing so surely to the degeneration of mankind as tobacco."

This may seem like an extreme statement, but Towns finds that he can rarely cure the alcoholic unless the patient gives up smoking, because the smoker finds that alcohol is necessary to relieve the irritability and nervous depression caused by the excessive use of tobacco.

The bad moral effect of tobacco upon boys is brought about in various ways. They are often forced to smoke surreptitiously, and to do this frequent the tobacco shop, pool, or barroom, where they obtain cigarettes and are naturally dragged downward by their surroundings.

A few words as to the composition of tobacco and the effect of different methods of using it. The chief constituent is one of the most powerful poisons known (nicotin), an oily, colorless, pungent, volatile liquid, existing to the extent of from 1 to 7 per cent. in tobacco. Virginia tobacco is one of the strongest. The taste and flavor of tobacco depend upon the development of a volatile oil in the curing. The injury arising from tobacco is due to nicotin and allied substances (pyridin and collidin), and also to furfurol, an ingredient of fusel oil in raw whisky, which causes the headache and other bad after-effects. But much of the nicotin is destroyed by its combustion in smoking, and there is said to be no furfurol in most of the Turkish tobacco ("London Lancet").

The harmfulness of smoking depends in part upon the amount of nicotin in the smoke. There is least in cigarette smoke and most in pipe smoke, while the smoke from cigars occupies an intermediate place. It has been found that even when the same amount of tobacco is smoked in the form of a cigarette and cigar, and the cigarette tobacco is much the richer in nicotin, the resulting cigarette smoke contains considerably less nicotin than the smoke from the cigar. This follows because in the cigarette the tobacco is finer and drier and in a form to burn completely. In the cigar, especially if green and moist, the nicotin volatilizes in the damp area behind the flame and is inhaled in the smoke. The black, moist, acrid mixture of tobacco and saliva in the bowl of an old pipe distils off its

nicotin when it becomes hot and produces the strongest smoke. The thinner and drier a cigar, the milder it is, because of its more complete combustion.

But cigarettes are most pernicious in their general results chiefly because they are so mild that their smoke is almost always inhaled. Inhalation increases the effect of nicotin many times. The area with which the smoke comes in contact in the lungs is enormous, and the lungs are made for absorption of gas (air), and the action is extremely rapid.

The opium habitué long ago discovered that he got more speedy and effective action by smoking than by swallowing the drug. Then, again, the cheapness and mildness of cigarettes causes them to be smoked at all available moments, when a pipe or a cigar would require too much time or expense. This applies particularly to boys, who now take more frequently to cigarettes, when formerly they would have had to smoke cigars or pipes. The danger of the overwhelming nausea and depression, and the expense involved in the use of these, was a great natural preventive which has been done away with in the introduction of the cigarette.

Cigarettes are most injurious, then, on account of the custom of inhaling their smoke and the temptation to smoke them continuously. There is about as much tobacco in one cigar as in five or six cigarettes.

Smoking is partly a narcotic, or drug habit and partly a psychic habit. The narcotic effect is seen in its soothing, comforting action, in its relieving anxiety and worry, and inducing a pleasant frame of mind. Its psychic influence is brought about by holding an object in the mouth (as is seen in the marvelous influence of sucking a blind nipple in the case of an infant), by the rhythmic inhalation and exhalation of the smoke, and by the hypnotic effect in

watching the smoke curl into fascinating and fantastic shapes and rings.

The physiologic demand of the system for tobacco is not so great as that for alcohol, cocain, or opium in habitués. In other words, on stopping the use of tobacco part of the craving is psychic, and this may be relieved by chewing gum, gentian, quassia, or lovage. The actual demand of the system for the drug effect of tobacco can then be resisted without great force of will, except in the case of the inveterate smoker. One who smokes one cigar daily after dinner may be classed a moderate smoker. The harmful effect of smoking is much less after a hearty meal.

The most practical result of smoking is lessened personal efficiency. Towns goes so far as to state that smoking diminishes the efficiency of an individual about 15 per cent. Smoking is indubitably opposed to the highest development of vigor and energy, or "pep," to use the picturesque slang of the day. This result must be presented forcibly to the youth who naturally desires to succeed in business and sports.

Tennis and billiard players know that smoking interferes with their accuracy of play and nervous power.

The matter of tobacco is in like case with other harmful habits, for no sensible person will affirm that smoking improves the health. Then it simply becomes a question as to how much injury tobacco does. This depends upon the personal constitution, the amount of nicotin absorbed, and the occupation. Its effects may be imperceptible in a parent, and yet lead to defective nervous organization in the offspring, as is indisputably true of alcohol. If we are smokers, we must confess ourselves fools to our sons in order that they may improve upon their fathers.

OPIUM AND COCAIN

Prevention of the morphin and cocain habits lies largely with the medical profession. Morphin is taken by means of the hypodermic syringe in most cases. It is first given by physicians for the relief of pain. After morphin has been administered for a month the patient has acquired the habit and will need outside assistance to free himself from it, even if he is no longer in pain from other causes. Statutes to prevent the purchase of the hypodermic syringe should be enacted. Only in New York at present does such a law exist, owing to the benevolent energy of Charles B. Towns. Physicians should hesitate to inject morphin except for unbearable pain of short duration. They should never entrust a patient with a hypodermic syringe except under most unusual circumstances. There appear to be over 100,000 opium habitués in the United States, averaging over 8 grains of morphin as a daily dose.

The cocain habit is begun because of the exhilaration and relief afforded when the drug is used by doctors for treatment of cold in the head or other nasal troubles.

It is very stimulating for a short time, and depression, which follows within about twenty minutes, excites a demand for more. It is the most difficult of all habits to break. Patent remedies containing morphin and cocain are also responsible for initiating the habit.

Members of the underworld acquire the morphin and cocain habits from association with habitués. It is possibly kinder to the race to let them perish as soon as possible. Most of the other thousands of drug addicts in this country are to be pitied and deserve treatment at the best hands. Their suffering is incredible, and nobody desires a cure more than the patient himself.

CHAPTER II

PERSONAL HYGIENE (Continued)

Care of the Teeth and Mouth: Pyorrhea (Riggs' Disease). Hygiene of the Digestion: Causes of Indigestion, Cooking, Value of Food Elements, Meat, Fish, Milk, Eggs, Cereals, Fats, Vegetables, Fruits, Vegetarian Diet, Salt, Necessity of Water, Purity of Water and Ice.

CARE OF THE TEETH AND MOUTH

THE care of the teeth and mouth has taken on a new significance of late owing to great progress in treatment of abnormal conditions, and because it has become evident that inflammations in the mouth—including decay of the teeth, and inflammation of the gums and tonsils—are the cause of many serious remote diseases. These include acute rheumatism, chronic joint diseases, heart disease, etc. In fact, because of the importance of this subject a separate chapter is devoted to it in another place (see p. 145).

Care of the teeth has hitherto been chiefly directed toward the prevention of decay, but it is of the greatest consequence that irregularities of the teeth and jaws should be avoided in childhood.

It is thought that adenoid growths, so common in children, produce a narrow upper jaw with a high or gothic roof of the mouth, and it is also probable that our use of soft, prepared foods in modern life leads to disuse of the jaws and their muscles, so that the jaws are not large enough to contain the teeth. It is certainly a striking fact that the fine, large, impressive jaws of our ancestors are not so commonly seen today. The first teeth must be watched

so that the second teeth may come regularly, or otherwise deformity of the jaw may be produced. Too early or late loss of the first teeth disturb the eruption of the permanent teeth. If one jaw is narrow, its teeth will not meet those of the other jaw, and the deformed jaw must be spread by the dentist. A narrowing of the upper jaw, with high, arched roof of the mouth, interferes with the breathing through the nose, and may thus lead to adenoid growth and pinched nostrils. Tonsils and adenoids must be removed to prevent extension of inflammation from them into the eustachian tubes which lead to the ears. Deafness in children, recurring colds, abscess of the ears, and mastoid disease of the bone of the skull behind the ears are usually caused by diseased tonsils and adenoids.

Protrusion of the teeth of the upper jaw may be induced by the habit of thumb-sucking in infants. Extra or supernumerary teeth constitute another cause of irregularity of the jaws. One must pay particular attention to the teeth during the period from the seventh to fourteenth years of childhood, as this is the time for the dentist to care for the first teeth and prevent their early decay, or straighten the teeth by methods which have reached such a state of perfection that they have become a specialty (orthodontia). Irregularities of the teeth produce spaces in which food lodges and thus favor decay. It has only recently been recognized by dentists that the prevention of decay is attained chiefly by regularity and perfect polish of the teeth. If the surface of the enamel is wholly free from irregularities and roughness there is no chance for food to stick to them and one might almost do without a tooth-brush. The advance in this branch of dentistry has been so great that now there are dental (prophylactic) assistants who spend their whole time in polishing the

teeth, removing tartar, etc. This is the ideal method of caring for the teeth, and the children of the present day will have their children treated in this way. A person should visit a dentist every month for this purpose, and although this seems a costly and onerous duty, yet the ultimate saving in health, suffering, and money will easily pay for the extra trouble required.

The teeth should properly be brushed after each meal and certainly once daily, before bedtime, as that is most important in preventing a long delay of food on the teeth. The brush should be rather soft, so as not to injure the gums, and have bristles of varying length to reach into irregular spaces. The brush should not be used as if it were a blacking brush, but more like a clothes brush, to brush the food out of the crevices. The brush should be kept in a corked test-tube or bottle containing 70 per cent. alcohol. Dental floss and toothpicks may injure the gums and should only be used when absolutely required. Twice a week the enamel should be rubbed smooth with a soft orange stick and tooth powder, unless one has the teeth cleaned regularly by a dentist, which is preferable. Our American dentists have an enviable reputation everywhere. The lack of care of the teeth and throat in childhood is very noticeable in the English, who frequently have false teeth in early adult life, and whose projecting upper teeth, narrow upper jaws, and pinched nostrils show indisputably the end-results of want of efficient dentistry and surgery of adenoids and tonsils.

Riggs' Disease.—Very common in adult life is Riggs' disease (or pyorrhea alveolaris), an inflammation of the membrane (peridental membrane) which surrounds the roots of the teeth beneath the gums.

It always begins, however, as an inflammation of the free border of the gums where they join the teeth. As the

mouth usually contains some fifteen varieties of bacteria (including the pus germs or staphylococci and streptococci), besides many other accidental organisms, there is only required some mechanical injury to the gums for inflammation to follow. First, the essential cause, the pus germ; and next, the predisposing cause, usually local irritation or general disease with reduced vitality of the gums. Recently it has been claimed that Riggs' disease is always due to a special germ (entameba) which may readily be destroyed by a special remedy (ipecac), but much doubt exists as to the correctness of this assertion.

Among the common causes of irritation of the gums, and so Riggs' disease, are poor dentistry, allowing spaces to occur between the teeth in which food may collect; ill-fitting crowns and bridges; and the accumulation of tartar on the teeth at the edge of the gums. Constant preventive care of the teeth by a competent dentist will avert all these causes of inflammation of the gums, which, nevertheless, occurs in 95 per cent. of adults (Black). Other causes of gum inflammations are the use of toothpicks, hard tooth-brushes, hot soup, tea or coffee, and injuries from sharp teeth and hard food. Bright's disease, tuberculosis, diabetes, and old age favor inflammation of the gums by reducing resistance of the tissues.

Some swelling of the gums occurs which gives rise to a space or pocket between the gum and the tooth. The formation of a pocket in the gum is most favorable for the growth of germs. The gums then become red and swollen and more or less painful, and matter or pus may be pressed out from these pockets as a small, whitish bead on the edge of the gums. If Riggs' disease is allowed to progress, the inflammation extends down along the membrane and hard substance (cement) covering the roots of the teeth, the gums recede, the roots of the teeth are exposed, and the

teeth loosen and ultimately drop out. An acute and chronic form are seen. The acute form occurs in fevers and other special infections or may be excited by local irritation from any of the causes noted above. The chronic form is much more common from the irritation of food between the teeth, bad dentistry, etc., as noted.

As germs may be absorbed from the inflamed gums and pass through the blood into most remote organs, there giving rise to most serious disease of the heart, joints, kidneys, stomach, gall-bladder, appendix, etc. (p. 146), the prevention and cure of Riggs' disease is most important.

Prevention and cure go hand in hand. All means of preventing irritation of the gums are essential, and therefore the avoidance of very hot food and the use of toothpicks, and injury to the gums by stumps of teeth, ill-fitting crowns, and bridges. The constant cleaning of the teeth (by a dentist) to prevent the accumulation of tartar, and skilful dentistry to avoid spaces between the teeth for collection of food, etc., are essential. When the disease has actually appeared the dentist removes tartar from the teeth, and if there are pus-pockets in the gum he must treat these so the lining of the pocket is destroyed, that union between it and the membrane surrounding the root of the tooth may occur. No tooth should be treated (except to remove tartar from the neck of the tooth) unless there is a pocket in the gum. If this were attempted the dentist would actually make pockets which did not previously exist. But, when all is said and done, the treatment of pyorrhea is very unsatisfactory. The pus-pockets may be made cleaner and the condition alleviated, not cured. The teeth are more or less destroyed and cannot be made whole again. In bad cases, with great recession of the gums, exposing largely the roots of the teeth, only extraction will cure. Prevention in treating the early inflam-

mation of the gums by efficient dentistry (which means constant supervision of the teeth) is the chief desideratum.

Finally, it may be desirable to treat the secondary infection with pus germs by the injection of vaccines (made from killed cultures of these germs) in bad cases with pus-pockets.

HYGIENE OF THE DIGESTION

Digestion should begin in the mouth; that is, the preparation of food for absorption should begin in the mouth through proper chewing, thus mixing the food with saliva, which digests cooked starchy food or changes it into malt sugar. This takes place chiefly during the first half-hour or so after arrival of food in the stomach, because the stay in the mouth is too short. After this time the acid gastric juice saturates the food in the stomach and stops the action of saliva. The digestion of unboiled starch by saliva is slight, and such largely passes through the intestines unchanged and may produce digestive disturbance, as seen in feeding raw bananas to infants or after eating raw chestnuts and vegetables. Dogs have no digestive substance or ferment (ptyalin) in their saliva, and it is thought that the main use of saliva consists in moistening food and facilitating chewing and swallowing. When food is swallowed in lumps they irritate the stomach and are not readily permeated by gastric juice. The *x*-ray has shown that one harm in hasty eating lies in too rapid distention of the stomach with food and air, which may produce pain.

Fletcherizing of food, on the other hand, is undesirable, and some disorders of the stomach are attributed to too prolonged mastication.

The necessity for the presence of a large proportion of the teeth in order that chewing may be properly accomplished is usually accepted, and the loss of most of the opposing teeth has been considered a fruitful source of

indigestion. One of the leading medical authorities of this country (Richard Cabot) affirms that he has never seen a case of indigestion he could attribute to loss of teeth. The mouth is inhabited by germs, and fifteen to thirty varieties have been found in it. What is much more important (according to Charles Mayo), pus germs exist in 80 per cent. of mouths (staphylococci and streptococci), and these are usually responsible for the inflammation of gums and tonsils and abscesses about the teeth, and they may enter the blood and cause serious diseases of the most vital organs (see p. 145). Moreover, the saliva should normally be neutral or alkaline, but probably over 80 per cent. of people have mouths which are not healthy (presence of pus germs), and these are apt to have an acid reaction in their saliva. Acid secretion is irritating and there is even danger of cancerous growth in the mouth from prolonged influence of acid. The healthy mouth is of great importance and largely depends upon proper care of the teeth and throat (modern dentistry and removal of adenoids and diseased tonsils).

Causes of Indigestion.—In another place we have taken this matter up in detail. There we have divided the causes of indigestion into four categories. It is in connection with the cases of faulty physique, and in those with inherited nervous weakness, that disturbance of digestion from slight causes is likely to occur. These constitute about one-third of all cases of dyspepsia, and are to be classed under nervous indigestion and that due to displacement of the stomach and intestines.

Any extra strain borne by the nervous system, as anxiety, worry, overfatigue, lack of exercise or work, abuse of tobacco, tea or coffee, sexual excesses, insomnia and emotional excitement, especially near or at meal times, favor the incidence of dyspepsia in such persons.

Among causes of indigestion to which all are susceptible may be named overeating, irregularity in the time of eating, improperly cooked or unpalatable food, unpleasant surroundings, hasty eating or eating alone, which is often the same thing, and abuse of alcohol. Drinking large amounts of water at meals dilutes the digestive juices and is undesirable. The desire for food, which includes appetite, palatability, and all the circumstances which make eating pleasant, as attractive service, agreeable company, a care-free mind, etc., have the most important influence upon digestion. Indeed, it has been found experimentally that "as the mouth waters" in anticipation of food, so does the gastric juice flow.

A piece of meat held before a dog which he cannot swallow, or a piece that is swallowed but escapes into the outer world through a false opening in the gullet, will produce as much primary flow of gastric juice as if the food entered the stomach.

Therefore the first phase in the secretion of gastric juice is brought about wholly through the nervous system by the desire for food. It can be readily appreciated how unpleasant emotions may have the opposite effect and check the nervous secretion (through the vagi) and so digestion. The second phase of secretion and digestion in the stomach is due to the presence of food in the stomach. There is a wonderful automatic mechanism by which the stomach contents escape and the intestinal secretion is regulated. As soon as a jet of the acid fluid contents of the stomach escapes into the small intestine (in which the secretion is alkaline) the acid in the bowel stimulates a nervous action, so that the outlet of the stomach closes until the gastric juice is neutralized by the alkali in the bowel, when the outlet again relaxes and another jet of stomach contents flows into the intestine. Thus, there is a continual auto-

matic opening and closing of the stomach outlet during stomach digestion. But this is only part of the effect of the acid on the bowel, for each time that acid flows from the stomach into the bowels it causes the formation of a substance (secretin) in the wall of the intestine. This is absorbed into the blood and stimulates the secretion of bile and of the gland (pancreas), emptying alkaline juice into the intestine. This chain of events continues until the stomach is empty, and thus the flow of alkali is automatically regulated by that of acid.

The two great factors in digestion are secretion and movements of the stomach and bowel pressing the contents along. The state of secretion in the stomach is precisely known by examination of the stomach contents, while the movements of the stomach and bowels are seen by use of the *x*-ray. These two methods of diagnosis are indispensable in chronic indigestion. Normal movements of the stomach consist of wave-like contractions, originating every ten to twenty seconds after the food enters the organ, serving to mix the contents with the gastric juice and propel them on into the bowel.

Intestinal digestion is brought about by the entrance of alkaline digestive juice from the pancreas and bile from the liver, through a duct about as large as a pencil, entering the intestines a few inches below the stomach outlet. The walls of the intestines themselves furnish an important secretion besides. Intestinal digestion is more important than that in the stomach, because all elements of food are digested by the alkaline juice here, while in the mouth the cooked starches are only partly digested and in the stomach only proteins. Moreover, an animal may live with a large part of the stomach removed. When through surgical operation an artificial passage exists between the small intestine and the outside of the body,

so as to drain off its contents, death speedily occurs with great emaciation.

Cooking has, of course, an enormous influence in increasing the digestibility of most food. In vegetables there is a large amount of starchy matter. By heat the enveloping membrane of the starch granules is ruptured and the starch thus is put in a state to be readily acted upon by the digestive juices. Frying food in a frying pan (sautéing) tends to saturate it with grease and to make it denser and harder, while frying in deep boiling fat (at 200° F.) causes an instant hardening of the surface in a uniform coat that, with the steam generated by the moisture inside, keeps the food from being saturated with fat. When a food is saturated with fat the digestive juices cannot penetrate or act upon it readily, so that frying in deep fat is preferable to sautéing. Pastry is indigestible owing to its richness in fat. Broiling is, on the whole, better than frying, therefore, and baking is preferable to boiling by keeping in the flavoring substances which may be dissolved out in boiling. When meat or fish are to be roasted, broiled, or fried, a high temperature should be applied in the beginning that an immediate coating be formed to retain the natural juices, while the cooking may be continued with more moderate heat. In making stews or soups the opposite course is proper.

In making stews the meat is placed in enough cold water to cover it, and it is allowed to cook very slowly until it reaches the boiling-point, and then is removed to the back of the stove to simmer till thoroughly tender.

In order to extract all the juice from meat for soup or beef-tea it is cut up and placed in cold water, or water at a simmering point, for several hours.

If food is taken very hot or cold the activity of the gastric juice is somewhat impaired.

In the process of digestion the food is rendered fluid and soluble so that it may be absorbed by the blood-vessels of the intestines. There is practically no absorption of food or water in the stomach which pass on into the bowels. The undigested and unabsorbed food is gradually propelled by the movements of the intestines, and the watery portion absorbed, so that it becomes a soft solid mixed with cast-off cells from the lining mucous membrane and bacteria (composing a large proportion of its bulk) in the lower or large intestine. A food is as much outside the body when in the stomach or bowels as if it were on the skin, so far as its nutritive value is concerned, unless it becomes digested and absorbed.

The **elements of food,** or nutrients, as they are called, consist of carbohydrates (starches, sugars, and vegetable fiber), fats, proteins, salts, and water. Any food containing all these in proper proportion to support life indefinitely is called a complete food. Milk is perhaps the best example of a complete food, but contains too much water for an adult. The curd of sour milk (from which the watery portion is squeezed) consists of casein, and is an example of a pure protein or nitrogenous substance. Butter is almost the pure fat of milk, and there is about as much carbohydrate, in the form of sugar, as protein and fat in milk (4 per cent. of each roughly). Proteins are represented in animal food by lean meat, the curd of milk, and eggs, which also contain in the yolk considerable fat. Vegetable food also contains protein, but not so much, in proportion to its bulk, as meat and eggs. So to get as much protein nourishment in a vegetable as in a meat diet one has to consume more than is comfortably possible —without the addition of cheese, eggs, and milk. The nearest approach to meat, in vegetable food, are dried peas and beans and nuts, and these contain approximately

the same amount of protein as meat (about 20 per cent.). But meat is more digestible and less bulky than peas or beans, for the percentage of protein is estimated by weight. Bread contains about 8 per cent. of protein. Boiled eggs contain about 13 per cent. of protein, but cheese contains 25 to 30 per cent. and is readily digestible. Oatmeal is also rich in protein (16 per cent. in dry meal), but when boiled the percentage of protein is low on account of water (about 3 per cent.).

The rôle of protein consists in supplying material to replace the waste of tissue in a constantly running machine and in forming new tissue in the growing person. The mechanism of the animal body is always "running," and an animal at rest is like a motor-car at a standstill with the engine moving. Therefore the animal at rest requires as much protein, as at light work, for repair of the machine.

Exposure to severe cold, hard work, growth, pregnancy, and lactation all demand an extra supply of protein. Protein, besides supplying material for building new tissue, yields heat and energy by being burnt up, chiefly in the muscles. It may also be transformed into fat, and a dog may live on lean meat for months and gain in weight.

Meat.—Proteins constitute the most expensive element in foods, particularly the concentrated form in which they exist in meat, fish, and eggs. Looking at meat in another way, it is the essence of nutriment extracted from vegetables. Lean meat is practically all protein, except 50 per cent. of water. Comparing the different meats, we find beef contains the most nutriment, but its coarser fiber makes it a little harder to digest than lamb or mutton. Mutton is more unpalatable than beef as a constant diet because of its stronger flavor. Beef streaked with fat is juicier and more palatable than lean meat. Very dark beef has not been bled or is diseased, while pale beef is not suffi-

ciently hung—both are undesirable. Veal is as digestible, although slightly less nutritious, than beef, mutton, or lamb. If veal is pale and soft it is too young (under a month), but if pale alone the animal has probably been bled to death.

Pork, although a most nutritious meat on account of its fat, is rather indigestible and not fit for children or those with weak digestion. Bacon, on the contrary, is both highly nutritious and digestible and stimulates the appetite. It is the most suitable form of fat (with cream and butter) to build up thin persons and the debilitated with feeble digestion.

One often hears a great distinction made between light (veal, chicken) and dark meat, the former being advised by some physicians in place of red meat in rheumatism, gout, Bright's disease of the kidneys, hardening of the arteries, etc.

There are certain nitrogenous bodies derived from proteins which are thought to put more work on the kidneys, liver, etc., and, therefore, are undesirable in disease of these organs. These bodies are extractives and purins. Extractives give flavor to meat and exist in large amounts in meat extract, clear soups, and broths. They possess very little nutritive or energy value, but stimulate the nervous system, appetite, secretion of digestive juices, and the combustion of other foods in the body. Purins are also nitrogenous and protein-like substances which arise from the cells of animals and plants. Sweetbreads, liver, brain, kidneys, fish-roe, caviar, meat extracts, and broths are particularly rich in purins. Among vegetables, dried peas and beans abound in purins, but are free from extractives. Vegetables contain no extractives found in meat. As a rule, vegetables are comparatively poor in protein and purins, especially green vegetables and roots,

as water is their chief ingredient. Thus, there is 75 per cent. of water in boiled potatoes and 97 per cent. in boiled cabbage. Fish is free from extractives, though almost as rich in proteins and purins as meat. A purin-free diet consists of eggs, milk, butter, cheese, sugar, bread, rice, macaroni, green vegetables and fruit, and this is the diet that is preferable where we wish to exclude the proteins considered most harmful in gout, rheumatism, Bright's disease, arteriosclerosis, and uric-acid stone. The extractives are normally the chief source of the principal waste-product from proteins in the urine (urea), and purins are normally the source of the other main protein waste-product (uric acid). While light meat of veal contains less extractives, it holds more purins, as does the flesh of most young animals, and the difference in the action of light (veal, chicken, and turkey) and dark meat is negligible. Fish is preferred to meat in some conditions as containing slightly less protein matter than meat, and no extractives. By many persons fish is considered more digestible than meat. In general, meat has been found more digestible by Chittenden. Fish containing much fat, as salmon, mackerel, and halibut, are more nutritious but less digestible than cod, haddock, flounder, and sole. For working men fat fish (like pork) is a most efficient form of protein.

The matter of diet stands out saliently as one about which doctors disagree. Nevertheless, normal persons gain nothing by living on a purely vegetable diet. Vegetables are, as a rule, less readily digestible and less stimulating to the nervous system, appetite, and digestion than meat and are much more bulky. The bulk, however, is often of great value in those disposed to constipation. Limiting the amount of protein (fish, meat, and eggs) is only permissible in adult healthy persons and should never be practised in the young. Even in the life of sedentary

people, one of the great living physiologists (Starling) affirms that an almost exclusive protein diet may be more suitable than a regimen of sugars and starches (carbohydrates), because these require oxidation for their combustion in the body and that is chiefly brought about by exercise. But proteins stimulate combustion of other food stuffs in the body. It is probable that the various diseases of middle age which are supposed to result partly from effect of the strain on the kidneys, liver, etc., in eliminating protein waste-products, are chiefly due to overeating and lack of exercise, for it seems unreasonable to assume that these organs suffer from overactivity of their normal functions in the elimination of natural waste-products.

A mixed diet of meat, fish, eggs, vegetables, and fruit is no doubt the best for ordinary healthy persons.

Meat is the most concentrated form of digestible food.

It is possible for persons to live on meat and water alone, as well as animals, because it contains some carbohydrate in the form of muscle sugar.

It is difficult to lay down any definite rules for guidance as to the use of meat. Some of the highest medical authorities believe meat to be harmful in hardening of the arteries, yet there are vegetarian monks and natives of Oriental and tropical countries who develop the most pronounced kind of arteriosclerosis upon a strictly vegetable regimen. And, on the other hand, Edward Stewart White records that the most robust and finely developed tribe in eastern Africa lives almost wholly on blood and milk. The amount of meat for daily consumption depends upon various factors—the age, occupation, and climate.

Young, growing persons, those doing hard physical and mental work, and those who work outdoors, especially in cold weather, require an abundant supply of meat, fish, and eggs. For most individuals leading a quiet, sedentary

life such a regimen is unnecessary and may be injurious. As meat is the most expensive food and the most palatable it is apt to be consumed too freely by the well-to-do. If there is a too abundant supply of meat, so that its products are imperfectly burned up in the muscles, certain diseases are thought to result, as uric acid, stone in the kidney, and possibly arteriosclerosis, while some forms of Bright's disease of the kidney are most unfavorably influenced by meat.

In disease as in health, however, a mixed diet is usually most desirable, and it is very rarely that a strict vegetable regimen is advisable (without the addition of at least milk, eggs, and cheese) except for temporary morbid conditions. As noted above, some authorities think no meat should be eaten in arteriosclerosis, and in some stages of Bright's disease it is harmful, and the same applies to gout and stone. But it seldom is necessary that even meat should be permanently abolished from the diet in any disease.

Fish.—At one time it was thought that fish exerted a tonic effect on the nervous system because of an appreciable quantity of phosphorus it contains, but this idea has no basis in fact. On the contrary, it is meat that is somewhat stimulating to the nervous system through its extractives. Shellfish, as lobsters, crabs, oysters, mussels and clams, must be eaten very fresh, never after they have been killed more than twenty-four hours. Crabs and lobsters occasionally poison some people, causing severe indigestion and vomiting, with eruptions—as hives. Some cases of typhoid fever have originated from eating raw oysters grown in water polluted with sewage. This danger has been generally prevented, and all cooked oysters are safe food, very digestible as well as nutritious, and are one of the few foods which have not enhanced in price of recent years.

Milk, as we have noted, contains an almost equal amount (about 4 per cent.) of protein, fat and carbohydrates (milk-sugar), and about 88 per cent. of water. In adults milk is not so completely digested as in children, and the bowel discharges may be rendered white from undigested fat. It takes about 3 quarts, or 15 glasses, of milk daily to support an adult at light work, and this large quantity of milk is apt to form curds in the stomach and bowels and lead to constipation, or occasionally diarrhea. The fact that milk in ordinary quantities is one of the most bland, digestible, and nutritious foods makes it the chief reliance in sickness. It is not generally appreciated, however, that a glass of milk equals in nourishment 2 eggs or 2 moderate-sized potatoes, or 5 tablespoonfuls of cooked cereal, or 2 slices of bread, or a large helping of meat, according to Roseneau.

Milk should be really regarded as a solid food because it becomes partially solid or curdled by the acid in the gastric juice as soon as it enters the stomach. To prevent the formation of a tough curd various means are used. The addition of one-third lime-water, or one-half carbonated water, or a pinch of salt aid the digestibility of milk. A teaspoonful of liquenzyme (Wyeth) added to a glass of milk may cause it to agree with persons otherwise unable to drink it. It is wiser not to drink milk cold from the ice, unless mixed with soda-water. When digestion is very feeble, broths, meat juice, and white of egg mixed with water are more appropriate than milk. Milk is more digestible if taken with some starchy food, as crackers or toast, and with the lighter meals (breakfast and lunch), or between meals and at bedtime. For thin and debilitated people the writer is accustomed to prescribe 1 pint each of thick cream and milk mixed, 1 glass at breakfast, 1 glass in the middle of the morning, 1 glass at luncheon, and 1 at

bedtime. Within a few months there may be a gain of as much as 20 pounds.

It is a curious fact that while milk is par excellence the food for infants and invalids, there is none which is so dangerous and capable of causing the worst of diseases, because it is taken raw and forms such fine food for disease germs acquired from the cow and man. We have gone into this more fully in another place, but the only safeguard, no matter how carefully milk is handled in white-tiled dairies and parlor-like barns, is cooking—by boiling or pasteurizing (heat at 145° F. for thirty minutes, followed by cooling). The Chinese put us to shame in this matter by taking no raw food, not even water, and so escape typhoid fever, etc.

Eggs form a concentrated food rich in protein (13 per cent.), while the yolk is exceedingly rich in fat (33 per cent.). For this reason eggs do not agree with some persons with weak digestions, since the fat of the yolk causes the sort of indigestion known as biliousness. The white of egg alone, which is practically pure protein (13 per cent.) and water, is often preferred for the sick, giving it in milk as egg-nog or stirred up with cold water and flavored with lemon and sugar. It is the large quantity of fat in the yolk which produces distaste for a constant diet of eggs in some persons. When eggs are placed in boiling water and allowed to stand in it off the stove for some ten minutes (coddled eggs), or are soft boiled, they are much more digestible than when hard boiled.

Cereals.—Vegetables are chiefly rich in carbohydrates or starch, although, as has been noted, dried peas and beans contain as much protein as meat, and, in addition, about 50 per cent. of starch. With fat pork, baked beans forms a very complete, cheap, and nutritious food suitable for outdoor workers. Soups of peas or

beans are also exceedingly cheap, palatable, digestible, and nutritious. Cereals contain from 10 to 16 per cent. of protein, the highest amount in oatmeal. They are composed chiefly of starch; rice and cornmeal being lowest in protein (7 per cent.), and highest in carbohydrates (78 per cent.).

Cereals are the most concentrated and nutritious of vegetables. Wheat contains about 12 per cent. of proteins, 68 per cent. of carbohydrates, and nearly 2 per cent. of fat, besides phosphates and other valuable salts. Bread consists of nearly 50 per cent. of starch and 7 to 8 per cent. of protein. Starch must be crushed, boiled, or roasted to break the cells in which it is found in nature and so become digestible. The new-fashioned already cooked, puffed, or shredded breakfast foods are not nearly so nutritious as the older forms of oatmeal, cracked wheat, hominy, graham meal, and Indian meal because they are too bulky.

Whole wheat, rye, and graham bread are especially useful in overcoming constipation and do not differ much in composition from white bread. There is not enough protein in cereals to form a complete food without the addition of fat, hence the rationale of bread and butter, but even here the bulk required is too great. Man cannot live on bread alone, even if it is the staff of life.

The products of digested starch and sugar are burned in the liver and muscles to produce heat and energy. Thus, while proteins build up the bodily machine and supply material to keep it in repair, carbohydrates (starch and sugar) act as fuel. Carbohydrates protect the more valuable proteins from being burned up, and are, to a certain extent, transformed into fat in the body.

Fats are two and one-quarter times more nutritious than carbohydrates; that is, fat produces two and one-quarter times as much heat in burning as carbohydrates. Fat in

the body is chiefly formed from proteins and carbohydrates in the food, as the fat in the food is burned up for immediate needs in the way of heat and muscular action. Fat is one of the essential structures of the body and acts as a storehouse, which may be called upon when the subject is unable to get sufficient nourishment in disease. Fat acts as a laxative in the bowels, and it is particularly valuable in nervous debility and wasting diseases. Fats are not usually so digestible as most proteins and starches, but those fluid at the temperature of the body are most readily assimilated, as butter and cream—but so is bacon. Olive oil is easily digestible for some persons in quantities of a teaspoonful or more two or three times daily, but it often acts as a laxative. It is most easily assimilated in French salad dressing. Nuts contain a large percentage of fat (40 to 60 per cent.) and proteins (12 to 28 per cent.), but are not particularly digestible.

Green vegetables and **roots** are composed chiefly of water, but are valuable on account of certain salts they contain. The absence of these leads to the most serious blood diseases, as scurvy, beri-beri, etc. Their succulence and indigestible residue are also useful in aiding the action of the bowels, while their palatibility is important. Boiling is the least suitable way of cooking green vegetables and roots because it removes their salts, unless the water is used for stews or soups. Steaming or roasting are preferable.

Fruits are composed chiefly of water, and their nutritive value lies mainly in the carbohydrates they contain, which consist of various sugars, starch, and gums. In addition to this, they are rich in acids which, when absorbed, are transformed into alkaline salts (carbonates) in the blood. The acids in fruit consist of citric (in oranges, lemons, grapefruit, limes); tartaric acid (grape), malic acid (apples,

pears, berries, rhubarb); also acetic and oxalic, and in some cases boric and salicylic acids. The amount of acid varies—in pears, 0.2 per cent.; in apples, grapes, plums, cherries, peaches, strawberries, 0.7 to 0.9 per cent.; in prunes and gooseberries, 1.5 per cent.; in currants, 2.15 per cent.; in lemons, 6 per cent.

Fruits also contain salts that are as valuable in preventing blood diseases as are those in fresh vegetables—*e. g.*, an infant dying of scurvy will recover almost instantaneously on orange juice. The vegetable fiber and acid in fruits account for their laxative effect upon the bowels. The composition of apples may stand for that of other fruit. They contain about 85 per cent. of water, 13 per cent. of carbohydrates, and but 0.4 per cent. of proteins. A fruitarian diet has been more or less in vogue of late, in which fruit is combined with nuts to supply protein. But this diet is then very low in protein, and is only suitable for temporary use in persons who have overeaten or require a low protein diet for certain disorders, as intestinal fermentation, obesity, gout, migraine, etc. Raw fruit is often undesirable because it is indigestible from being underripe, or poisonous from the presence of germs and overripeness. Persons with weak digestion and children should only eat cooked fruit, with the exception of oranges and cherries. Raw strawberries are particularly harmful because they grow on the ground and may be contaminated with intestinal bacteria from animal or even human excrement. They should be stewed. Raw apples quite commonly disagree with children and adults with weak digestion. Bananas contain a large percentage of raw starch, and the writer has seen severe indigestion and even convulsions produced in infants by raw bananas. Baked bananas are very digestible. Salted foods are commonly considered more indigestible than the same food

fresh, as salt herring, salmon, cod, salt pork, corned beef, etc. Salt abstracts water from food, which, therefore, becomes drier, denser, and harder. But some food which is cured by salting and smoking is quite digestible, as tender boiled ham, which may be eaten by persons with feeble digestion.

Vegetarian Diet.—A final word as to a vegetarian compared to a mixed diet. Man was made to exist on a mixed diet, as shown by his teeth and digestive apparatus. People who live on a mixed diet are more alert, active, and energetic, mentally and physically, owing (probably) to the stimulating effect of the extractives in meat and to the smaller bulk of mixed food requiring less energy for its digestion. The same elements of food exist in both animal and vegetable diet, but the animal is rich in proteins and the vegetable in carbohydrates. Even those vegetables which are rich in protein, as dried peas, beans, and nuts, are considerably more difficult of digestion. The various disadvantages of meat diet are met by like disadvantages of a vegetable diet. The physical superiority of the American or European over the Hindu or Japanese is apparent, although the latter have progressed enormously since they have begun to eat more flesh. Ferocity is supposed to result from meat eating, but compare the buffalo, rhinoceros, and Chinese pirate—all vegetarians—with other animals for cunning and ferocity. The vegetarian is less energetic because his functions are less vital. Herbert Spencer had to rewrite a book first written while he was on a vegetarian diet. The physical strength of meat-eating men and animals is far above that of any vegetarian animal. No vegetarian animal can lift the weight of his own body, but Louis Cyr lifted over a ton, and a lion carrying a calf its own weight has been known to jump a hurdle 6 feet high (Tibbles).

Vegetarians are not more healthy or long lived. The diseases claimed to be caused by meat, as gout, stone, gravel, Bright's disease, hardening of the arteries, diseases of animals, ptomain poisoning, etc., are balanced by disorders produced by too much starch and sugar, as indigestion, acidity, flatulence, obesity, diabetes, cholera, dysentery (from germs on raw food), pellagra, and beri-beri, etc. Vegetarians are not generally so robust, alert, active, and energetic as meat eaters, but are apt to suffer from indigestion and anemia, and to have a poor circulation.

A vegetable diet, with the addition of milk, eggs, and cheese, is, however, a wholly different matter, and may be the best regimen for some persons. It may be said that the well-to-do, of middle age and over, eat too much meat as a rule. A single moderate helping of meat once daily is sufficient for such persons. In many diseased conditions and for the aged total abstention from meat for a time, or permanently, may be desirable, but such a diet should be determined upon individually by consultation with a physician. It is unfortunately true that much of the advice given by the average doctor concerning food rests largely on tradition or hearsay. Thus, a leading consultant recently told a relative of the writer not to eat grapes because the urine would be made more acid. As we have noted, the acid in fruits is generally transformed into alkaline carbonates in the blood and these tend to make the secretions more alkaline.

Salt is a most important constituent of the tissues, gastric juice, and blood, but enough is ordinarily taken on and with the food.

Water should be consumed in abundance—6 to 8 glasses daily. It is better not to take too much water at meals, not more than half the daily amount, and the rest between meals. Too little water favors stone because

there is not enough water to dissolve the solids eliminated by the kidneys. In the reduction of obesity water should not be taken at meals, as water increases the appetite and allows more food to be washed down. Only tea, coffee, and soup are allowed in those reducing weight. A copious supply of water is very essential in preventing constipation. Water-drinking has been rather a fad and therefore overdone. The drinking of several quarts of water daily is undesirable, as it causes inaction or atony of the stomach and its distention, whether the water be hot or cold. The consumption of ice-water at meals tends to check the secretion of gastric juice and digestion.

Water-supply.—The importance of a pure water-supply is everywhere recognized. Surface-water and bodies of water which receive drainage from the surface are likely to be polluted with the bowel and urinary discharges of men and animals, which may give rise to many diseases, especially typhoid fever, diarrheal diseases, and intestinal parasites. In this category may be included springs, rivers, ponds, lakes, and shallow wells. The state chemist of Indiana has recently found (1915), in the examination of 5000 wells in thickly populated sections, that over 50 per cent. are polluted, and he advises that every surface well in Indiana be abandoned. The discovery of the germs normally present in the intestines (colon bacilli) in numerous small samples of drinking-water is considered a sure sign of its pollution with sewage. It is wise to have a domestic water-supply examined by a competent bacteriologist and chemist, such as any city health department employs. Rain-water is pure (except for the dust it washes from the air), and if the first washing from the roof is turned away from the conductors by an automatic device, and if the cistern is lined with cement and is absolutely tight—to exclude dirt, surface-water, and ver-

min—the rain-water will remain pure. The cistern-water should have an overflow pipe on the surface of the ground covered with wire gauze. The number of square feet in the ground plan of a house will constitute the roof area for collection of rain-water. Thus, a 40 by 40 feet ground plan (1600 sq. ft.) will give a roof area which will catch about 1000 gallons of water from 1 inch of rainfall (Harrington).

Driven and artesian wells usually supply pure water because water from deep subsoil is ordinarily unpolluted. This is not always the case, however, as fissures in deeply embedded rocks may lead polluted water to great depths. The safest surface wells are those of brick or stone lined throughout with cement, and covered so tightly that surface-water and vermin are excluded. They may become polluted from drainage into the deeper layers of the subsoil from cesspools and privies.

Boiling water for fifteen minutes is the simplest method of purification. To restore its normal taste it should be poured from one vessel to another, to mix it with air, after it has been boiled. Most filters are useless in removing germs. The Chamberland-Pasteur filter, made of unglazed earthenware, through which the water must slowly find its way, is the only filter which prevents disease germs from passing. It must, however, be scrubbed and boiled ten minutes twice a week (Harrington). It is fastened to the water faucet. Chlorid of lime, or bleaching powder, is a safe agent to use for sterilizing water, since it does not impart much taste or odor and is perfectly harmless in the amount used. Six hundred cities in this country and Canada use it to purify their public water-supplies. One teaspoonful of the following chlorid of lime solution is added to 2 gallons of water, which should then stand fifteen minutes or more before it is fit to drink.

The solution itself is made by dissolving 1 teaspoonful of fresh chlorid of lime in 1 quart of water, keeping it tightly sealed in a Mason fruit jar.

Ice.—To avoid dangers from ice composed of impure water, containing possibly the germs of typhoid fever, diarrhea, and dysentery, one should always use clear ice which is made from pure water or water from which the germs have settled out. Clear ice is safe ice. If ice contains germs it is rarely absolutely transparent. One should avoid ice-water in public places when the ice is floating in the water. Water should be cooled by surrounding it with ice which does not come in direct contact with the water. The reason for this is that ice may often be handled by persons with hands soiled with their own excretions, and thus may be a means of transmission of typhoid fever, diarrheal diseases, and intestinal parasites.

One would certainly not drink water in which such persons as servants and railway employees had dipped their hands, yet one does it every day unwittingly, in the form of melted ice.

The fashion of late dinner is based on the fact that leisure at this time favors digestion, in that blood is not drawn away from the stomach for mental or physical labor. A heavy meal in the middle of the day conduces to inactivity in mental workers. In the case of children and elderly persons it is often best that the heartiest meals be breakfast and at midday and the lightest in the evening. Candy, ices, and sweets of all kinds are the bane of children's digestion and health. Sometimes only the discipline and isolation of boarding-schools will prevent this dissipation. The proper standing position is requisite for good digestion and this is considered under Digestive Disorders. Corsets constricting the waist displace the stomach downward

and interfere with digestion. The straight-front corset, loose above, is the best type.

In order to calculate an economic and sufficient diet scientifically all articles of digestible food consumed each day are reckoned in terms of heat value; that is, the value of food is considered to lie in the amount of heat it will produce in burning outside the body. This follows because food undergoes what is practically combustion within the body. The unit of food value or calory is that amount of heat required to raise 1 kilogram (about 1 quart) of water from 0° to 1° C. The daily food requirements for adults vary, according to different authorities, from 2500 to 3000 calories, containing from 100 to 130 grams of protein, 50 to 100 grams of fat, and 250 to 500 grams of carbohydrates. Fat and carbohydrates are more or less interchangeable, fat, however, producing $2\frac{1}{4}$ times more heat than an equal weight of starch or sugar (carbohydrates). It is now customary to give the heat or calory value of food per ounce in tables showing the composition of food. Take milk, for instance, the heat value is equal to 20 calories for each ounce, or 640 per quart. Four quarts of milk would be required to afford the daily 2500 calory food requirement.

CHAPTER III

PERSONAL HYGIENE (Continued)

Exercise: Special Exercises for Different Ages, Rationale of Exercise. Clothing. Baths: Outdoor Bathing, Lukewarm, Warm, Hot, Turkish, and Cabinet Baths. Ventilation: The Complexion: Sunburn, Freckles, and Acne. Care of the Hair: Baldness and Dandruff. Care of the Finger- and Toe-nails.

EXERCISE

Special Exercises for Different Ages.—From infancy up to the seventh year muscular movements are not precise nor finely co-ordinated. The nervous and muscular systems are not sufficiently developed for the performance of accurate and co-ordinate movements.

Thus, the baby begins kicking and moving the hands and legs; then picking up and dropping things; playing with blocks and digging and piling dirt or sand come next, and later running, throwing, cutting and folding, and the use of bows, slings, and the knife. From seven to twelve the outer (cortical) areas of the brain, which control motion and sensation, are chiefly developed, and finer and more complicated movements after this time are possible. Simple ball games, hide and seek, tag, leap-frog, marbles, baseball, football, swimming, riding, bicycling, wrestling, and fishing begin in this period. Subsequent to this age the highest functions of the brain develop, as self-control, association of ideas, and judgment. It is at about twelve that the ability for team play begins, and this mental plane is equivalent to that of the savage.

After twelve exercises requiring precision and accuracy may be undertaken, as manual training, playing musical instruments, baseball, cricket, fencing, tennis, boxing, bowling, etc. The heart is not equal to long-sustained competitive athletics at this age, particularly long distance running. The heart gives out by becoming dilated and only short distance competitive running should be allowed until boys are eighteen. School and college athletics tend toward special and excessive development of the select few in competitive sports, whereas the ideal training consists in general physical development of all. To bring this about in youth there should be three half-hours weekly given to gymnasium class exercises, together with outdoor sports and walking. The special objects should be to overcome by appropriate exercises any special inherent physical weaknesses or shortcomings (either under- or over-development of parts), and to produce a fine general bodily development, and to bring out those special qualities so essential for any successful career—energy, alertness, strength, courage, and endurance. A youth should walk when he may ride, run when he may walk, and climb when he may be lifted (elevator). All the athletic outdoor sports should be his—skating, rowing, swimming, hunting, and fishing. Dancing is not to be despised.

The various systems of home exercises by correspondence have advantages and disadvantages. They are very apt not to be kept up, as they are not sufficiently agreeable, being taken as a duty rather than pleasure. They resemble the use of the axe for exercise, which fond parents are apt to urge on their sons who are bursting for sport.

These home exercises usually consist in developing certain muscles by bringing into play the action of opposing muscles. This means the resistance of the action of one group of muscles by an opposing group. For example,

one has to concentrate the mind strongly upon bending the arm at the elbow, while at the same time making this movement difficult by contraction of the muscles opposing this action. By going through such exercises conscientiously for twenty minutes each morning on rising, and following them by a shower and vigorous rub with a coarse towel, one may greatly increase the muscular strength. But this training has the tendency to make one "muscle bound" and not fit for skilled sports, where accuracy of movement, quickness, alertness, suppleness, and grace are desirable, as in tennis.

The expense and secrecy attending the taking of such systems of physical exercise add to their allurement, and they are doubtless better than no exercise at all, although they do not favor all-round development, as do many outdoor sports. The systems which consist of bending of the body and movements of the limbs are more suitable for the mature business man who wishes to exercise at home without apparatus. ("Ten Minutes' Exercise for the Busy Man," Dr. L. H. Gulick; "Fifteen Minutes Invested Daily for Health's Sake," W. J. Cromie.) Walking is the cheapest and easiest form of exercise for those in middle life or beyond. Walking should be done at a brisk pace, and one should not brood over one's self or one's troubles, as mental relaxation is as important as exercise. This is the advantage of golf, as it is almost impossible to think of other things when devoted to this engrossing game. In walking one should "go about admirin' 'ow the world was made." When one is greatly taxed by mental work it is bad to burn the candle at both ends by trying to exercise at the same time. In such cases rest may be found essential. Muscular fatigue also generates chemical substances which may act as poison to the blood-vessels and induce arteriosclerosis, which is so synonymous with old

age. One should feel refreshed after exercise, and not the reverse.

The special exercises and sports suitable for the middle aged and elderly include golf, bicycle riding (without hill climbing), walking, horseback riding, bowling, hunting, fishing, and gardening. Violent exercises of all kinds are undesirable and often dangerous, such as boxing, fencing, mountain climbing, tennis and handball, running, rowing, basket-ball, and long distance swimming. The rules for middle age should be the reverse of those for youth. One should not take any unnecessary violent exertion, one should walk rather than run, and not lift heavy weights, as a trunk or articles of furniture. For the elderly the most suitable exercises are walking, riding or motoring, and billiard playing. Of course, it makes a great difference whether one has kept in good muscular training from youth onward, and such may take much more strenuous exercise than individuals not accustomed to physical exercise. Our famous Secretary of State, Mr. Richard Olney, was an expert tennis player well into his sixties.

Rationale of Exercise.—Exercise or muscular movements depend upon three factors—a normal nerve impulse, contraction of the muscle, and an efficient supply of fuel. It is not sufficiently appreciated that complicated movements, such as are required by the simplest actions in life, are as much nervous as muscular, and by them the brain and nervous system are developed as well as the muscles. In the performance of muscular movements there are to be considered the origination of an impulse in the motor area of the outer part (cortex) of the brain, its conduction along the spinal cord and thence along a motor nerve, and the answering contraction of the muscle.

In voluntary movements the impulse travels from the brain at the rate of about two miles a minute. Automatic

movements are those occurring when impulses are sent from the central nervous system without any conscious knowledge, as in the case of the beating of the heart and the movements of the stomach and bowels. Reflex action takes place when the end of a sensory nerve is stimulated and the impulse is carried along it to the spinal cord or brain, and is transformed by the nervous center into an impulse traveling back along a motor nerve to a muscle—resulting in its action. Reflex movements may occur in sleep and unconsciousness, and even when opposed by the will, as in the case of winking when the eyeball is touched.

The fuel required for muscular action is chiefly derived from the starches and sugars of food. These are burned in the muscles in the form of a kind of sugar (glycogen) by means of the oxygen brought in the blood from the lungs. Thus heat and energy are produced. Sugar is, therefore, one of the best stimulants to muscular action and is fed soldiers on the march, often as chocolate, rich in both sugar and fat. Meat and fat may replace sugar and starches when they are absent from the food.

Muscular fatigue is due to three factors—it is caused by nervous exhaustion, by the chemical waste-products of muscular contraction (chiefly lactic acid), and by consumption of the fuel which supplies muscular contraction. The nervous element in fatigue has been found by Crile to depend upon actual changes in the brain, seen microscopically after overuse of the muscles in animals. This fact enforces the necessity of a normal nervous system for the successful accomplishment of physical exercise. The converse is seen in the absolute loss of muscular power in nervous prostration, so that even talking or lifting an arm become a great exertion.

The use of all drugs tending to impair the nervous system, particularly tobacco and alcohol, are, therefore,

essentially inimical to the best performance of any athletic feats requiring endurance and the most harmonious action of various groups of muscles.

Muscular and nervous development through exercise, therefore, go hand in hand. The muscles themselves enlarge through increase in muscle cells and grow stronger because more of their fibers come under the control of the nerves, and because the nervous impulses become more intense. The rapidity of transmission of the nervous impulse from the brain along the nerve is also increased.

Occasionally fibers of muscles break during severe exercise, and sore spots and occasionally lumps form in the muscle and persist for several weeks. In the parlance of the trainer this is called "charleyhorse."

The *effect of exercise upon the breathing and heart* are most important. During violent muscular exertion more blood must be carried to the lungs in order that the increase of waste-products from the muscles (carbonic acid gas) may be there gotten rid of and replaced by oxygen, which is needed in excess in the muscles to burn the fuel. At first the breathing becomes violent, rapid, and shallow, and dizziness and even unconsciousness may ensue—in running for instance. Usually one gets his "second wind" in about three minutes, which means that the breathing has become deeper and more powerful, that more oxygen is taken in and more carbonic acid gas exhaled, and that the action of the heart is stronger. This forced breathing is brought about automatically by increase of carbonic acid gas in the blood, which stimulates the center of breathing situated at the base of the brain.

Since violent exercise demands a greater supply of blood in the lungs, heart, and muscles, the heart responds by more rapid and stronger contractions. These later become slower and more effective, since the heart dilates

to hold more blood and, therefore, more may be forced out at each contraction. Exercise excites reflexly centers in the brain that stimulate the heart's action, while the distention of the cavities of the heart with more blood and the increased heat of the blood in exercise both stimulate the heart. In a man in athletic condition the normal pulse of 70 may increase to 130 or even 190 beats per minute during sudden and violent exertion, but soon returns to normal. In the man out of condition the pulse may remain high and somewhat irregular for some time after severe exercise. During the exertion of rising suddenly from a lying to standing position, in the normal individual, the heart is naturally quickened by some 12 beats to the minute, and if it increases by as much as 20 beats it is a sign of poor physical condition. Again, in rising suddenly the blood tends to leave the brain and collect in the muscles of the lower extremities. The normal tone of the vessels and heart tend to prevent this. If the blood-pressure is taken before rising and immediately after rising from a horizontal to an erect position, in the arm of an individual with poor tone of vessels and heart, the pulse will be quickened more than 10 beats and the blood-pressure will fall in the arm after rising. In the highest physical condition the blood-pressure is increased in standing, owing to an immediate, compensatory, heightened tone of the vessels and heart, and the pulse is augmented but a few beats.

Thus, Crampton has introduced a scale to test the physical condition by estimating the blood-pressure and pulse-rate of an individual lying and standing. A person getting 100 per cent. would have a rise of 10 in blood-pressure and only 4 in pulse-rate. If the blood-pressure falls when one rises into an erect position, this occurrence leads to increased rapidity of the heart in its natural endeavor

to fill the vessels. Crampton's test is still *sub judice*. But unquestionably a quick return of a rapid pulse to normal after exertion is a most reliable sign of a good physical condition.

In former times it is reported that short operations were performed on persons painlessly by having two strong men lift the patient suddenly from a horizontal to the erect position. Partial unconsciousness or faintness followed, owing to the blood leaving the brain during this procedure.

Dangers.—The chief danger in sound persons from sudden violent exercise, especially when they are not in training, is acute dilatation of the heart. This also occurs in athletes in running, rowing, football, etc., but in them the heart usually returns to normal within a few hours or days. As we have said, in getting "second wind" and in all violent exertion the heart dilates somewhat, but it is excessive dilatation of which we speak. This is shown by blueness of the face, bleeding nose, breathlessness, and dizziness. In those not in training, especially under fifteen and over thirty, the dilatation may persist for a long time or always, and a weak heart result. This sometimes occurs in elderly persons when mountain climbing after leading a sedentary life.

In young children the volume of the heart is proportionately much smaller to the diameter of the vessels than it becomes later, for during adolescence the volume of the heart increases enormously (twelvefold) and the diameter of the arteries only threefold (Benke). So that overexertion in children, up to the age of fifteen and over, causes great strain on a heart which is not fully developed in size or strength, but especially in size. In an experiment on 40 boys, from seven to fourteen, Riviere found that after a walking excursion which lasted a week, in which the boys walked five to seven miles daily, there was dilatation

of the heart still persisting two and one-half months in 10 of the younger boys, and it seemed probable that from one to two years would be required before their complete recovery (McKenzie).

Any sudden and violent effort, as in lifting, wrestling, and running, greatly increases the blood-pressure momentarily (from the normal, 109, to 210 in McCurdy's tests), and this may lead to rupture of an artery in the middle aged and elderly, though never in a sound young person. In more moderate continuous exertion requiring endurance the blood-pressure rises, though not to so high a point, but falls rapidly and below normal in the sound individual. The pulse-rate increases more markedly and does not return to normal nearly so soon. Thus, in bicycling for half an hour Bowen found that the blood-pressure increased from 140 to 190 at the end of this time, and the pulse from 72 to 132. Within ten minutes after completion of the ride the blood-pressure fell to 130 and the pulse to 102, but only after another half-hour did the pulse become normal (72).

The **best exercises** are those bringing into action large groups of muscles and developing the body as a whole. When a muscle contracts it squeezes the blood out of its veins, and at the same time in shortening it widens and allows more blood to flow through the arteries, so that three times more blood is supplied to a muscle during exercise than at rest. Indeed, the muscles are veritable hearts. The heart gets its own blood supply, both during contraction and in the rest periods, and when it beats violently during general exercise it is supplied with more blood than usual and develops accordingly, like any other muscle. General exercises developing large groups of muscles and the vital organs—the heart and lungs—include running, swimming, rowing, skating, wrestling, boxing, riding, fencing, and dancing. These are the chief

developmental exercises and differ from special exercises which develop small groups of muscles. It is especially in youth and after middle age that care must be taken to avoid severe, sudden, or prolonged exertion.

CLOTHING

We can hope to exert but little influence upon the fair sex in the matter of clothing, since fashion is the sole dictator of dress in most instances.

One not rarely sees a wonderful combination of such material as a sort of refined mosquito netting and fur in the composition of an outer garment, and it is not unusual to observe the distribution of fur over remarkable portions of the anatomy, the remaining parts having little or no covering whatever. Then at another time fashion may demand a wholly different anatomic arrangement of the furs without regard to weather or season. In attempting to remonstrate with patients, the doctor is either met with fallacious arguments, on the one hand, or demure acceptance on the other, without any endeavor, however, on the part of the patient to put the advice into use. In the matter of night garments the physician is equally futile. The total exposure of the upper part of the body is not conducive to avoidance of rheumatic or catarrhal affections of this region, or to their recovery.

In underclothing the two qualities of most importance are those of retaining heat and absorbing perspiration. Wool is pre-eminently the best non-conductor and, therefore, prevents the bodily warmth from escaping. Many persons think they cannot wear wool because it causes too much irritation of the skin. Marino, or mixtures of wool and cotton, may be used, or materials made with cotton on one side and wool on the other.

Wool also absorbs perspiration readily and evaporates it

slowly and is the best material for underwear the year round. Wool shrinks and becomes matted or felted by frequent washing; but this trouble may be averted to a considerable extent by washing in tepid water with frequent rinsing, but avoiding forcible wringing or rubbing.

Cotton clothing is now worn by many indoor workers the year round. The fabric does not naturally absorb moisture so readily and cools the body more than wool when wet, nor does it retain heat as well as wool or fur, which contain so many air spaces that act as non-conductors. Yet cotton is woven loosely in such a way as to serve as a good substitute for wool in those not exposed to cold, wet, or drenching sweat. Linen is about on a par with cotton in absorbing moisture and retaining body heat. Linen garments are more expensive, but will stand more washing. The linen mesh is particularly appropriate for the tropics and hot weather in imparting a sense of coolness. Silk underwear is expensive and shrinks in washing, but absorbs perspiration readily, and is cool and pleasant for summer use. Impermeable materials, as rubber, mackintosh, and leather, are chiefly of value for outer garments in protection against wind and wet. They retain the moisture of the body, and so are unsuitable for wear next the skin, or even as outer covering when one is taking violent exercise. Brightly dyed underwear and stockings are undesirable, as the anilin colors irritate the skin and produce eruptions. If the feet perspire freely the stockings should be changed often so as to be clean. By first soaking the feet in hot water, and then drying them and dusting on a mixture of salicylic acid (1 part) and starch (3 parts) the perspiration will be much reduced. The same treatment is useful in troublesome sweating of the hands or armpits and to prevent its attendant bad odor. If the clothing is damp the growth of bacteria and parasites of skin diseases is

favored, so when perspiring freely the underclothes should be changed and put into the wash or well aired and dried before wearing them again. White cotton or linen outer garments are worn in the tropics because dark colors absorb heat rays of the sun more readily and because cotton or linen do not retain bodily heat like wool. Many persons wear too heavy underclothing in winter. For those exposed to severe outdoor weather in their business thick underclothing may be essential, but is apt to make indoor workers sensitive to cold and subject to colds.

The more sensible way is to wear but little heavier underclothing in the house in winter than in summer, and to dress very warmly in ulsters, furs, etc., when going out into the cold.

Hats should not be made to fit the head exactly, as they are not comfortable and do not afford proper ventilation. The shape of shoes most desirable is of importance and is discussed in another place (page 328).

BATHS

Baths are not by any means of use solely for cleansing purposes. A cold plunge is not particularly cleansing, yet has a marked influence upon the body. A daily cold bath (50° to 70° F.) tends to render the skin less sensitive to cold, and so prevents colds, and has a pronounced stimulating effect upon the circulation, respiration, and nervous system. This action is seen when cold water is dashed upon the face and chest in fainting, or in failing respiration, and is relied upon to resuscitate newborn infants, when they fail to breathe, and to restore persons in a fainting condition. The cold bath is customary among the better class of English and Americans, and the ruddiness, robustness, and fine complexions of our insular cousins may be due in no small measure to this habit.

A daily cold bath should be taken by all healthy youths and adults under middle age if they are able to secure the reaction or warm after-glow which should succeed the bath. The bath should be taken in a warm room, to favor reaction, and be followed by vigorous rubbing with a coarse (linen mesh is best) towel. In case a person suffers from chilliness after the bath it may often be obviated by standing or sitting in hot water while cold water is used by sponging or by a shower. Cold sponging with salt and water while standing in warm water is a good method for delicate children when followed by brisk rubbing with a coarse towel.

Persons not habituated to cold baths should begin them in summer, and then may continue them through the winter months without discomfort. In taking cold baths, plunges, or showers the water should not come in contact with the body more than a minute or two. Cold baths are undesirable and often harmful for young children, persons with kidney disease or hardening of the arteries; or elderly individuals, unless they have been habituated to them all their lives. Also cold baths are inadvisable for women during menstruation and in the later months of pregnancy, and for both sexes when much fatigued or very hot after exercise. A cold plunge is not injurious, however, for healthy persons perspiring mildly after moderate exercise.

Outdoor Bathing.—Sea-bathing (60° to 75° F.) has the beneficial action of the cold bath plus the salubrious effects of one of the best forms of exercise in the fresh air, the stimulating influence of the waves and salt upon the skin, and the pleasure and sunlight. The temperature range is considerable, and the proper duration of the bath depends upon this—anywhere from two to twenty minutes. Two minutes is too long in many parts of the Northern New England and Pacific coasts, whereas twenty minutes is

almost too short in the shallow and warm waters of Cape Cod and the middle and southern Atlantic shores of the United States, where the water reaches a temperature of 72° to 75° F. or more. There is great harm done children and delicate persons through a prolonged stay in cold water. A warm reaction should follow sea-bathing, as after the cold bath indoors. One so frequently sees persons blue and shivering loitering about on the shore or knee-deep in cold water instead of taking a plunge and then out. There is immense loss of heat and combustion of food or tissue in the body to supply this. The result is a great drain upon the vitality, exhaustion, and often loss of weight after a prolonged course of cold sea-bathing. Cold water has a more powerful influence in reducing the temperature of the body than any other means known, hence its use in fevers and sunstroke.

Especially pernicious is the habit children have of playing out of the water in wet bathing suits (thus cooling the body by evaporation), and then returning into the water, or of wading in cold water while their bare heads are exposed to the burning sun—a most favorable procedure for sunstroke. To stay in cold water long one must be stout, since the layer of fat under the skin acts as a non-conductor, keeping heat in and cold out. Women have more subcutaneous fat than men, and their greater ability to stand around in cold water, as compared to males, is notorious. Long-distance swimmers must be fat to withstand the cold and exhaustion.

It is always wise to wet the head before entering cold water, and it is unwise to bathe when excessively hot, but it is safer when moderately warm from exercise than when beginning to cool off. It is the custom not to bathe until three hours after meals, because the action of cold water alters the distribution of the blood to the digestive organs

and other parts of the body. From bathing soon after eating persons have suffered from nausea, vomiting, cramps in their bowels, and even death.

Cold applied to the skin drives the blood into the internal organs and to the head by contraction of the external blood-vessels. This is the reason for first wetting the head. To those used to cold baths sea-bathing may be indulged in before breakfast. The rule in all cases should be never to stay in water until one has blue fingers and lips and is shivering and chattering with cold, for one should always feel warm after the bath.

Sudden and unexpected deaths occur in swimmers and bathers from fainting, overexertion, and cramps. Swimming is tremendous exercise, since it brings into play most of the muscles in the body. If one is swimming at top speed and in rough water the strain is extreme on even the healthy heart. The writer watched a professional athlete in pink of condition give out through making extraordinary efforts in swimming to catch a drifting boat. Seeing a sudden pallor come over his face, the swimmer was rescued just in time. If the heart is naturally weak the exertion of swimming may easily cause it to fail. Sometimes a weak heart will momentarily stop when a person jumps into cold water. The author has known this to happen twice in the case of a patient jumping into a swimming pool. Drowning will result unless help is directly at hand. From a long experience in swimming the writer believes that the dangers of death from cramp are somewhat exaggerated. Long swims are dangerous unless a person is in first-rate physical condition. The author had an impressive experience in the water with a swimmer fresh from sedentary occupation in the depressing heat of a city who undertook a considerable swim and gave out when half the distance. Only encouragement, making light of the occurrence, and

slight assistance saved the swimmer from death by heart failure. Those who faint readily, who have palpitation or other disturbance of the heart, the elderly not habituated to cold water, and persons who do not react satisfactorily to cold bath should refrain from outdoor bathing. There is some danger in diving that water may be driven up the nose and into the ears through the eustachian tubes. Ear abscess may result.

A word as to swimming tanks: Eye, ear, throat, and sexual infections are sometimes contracted from water in common use by bathers, even when care is taken to require a preliminary shower, etc. Intestinal germs are not infrequently found in the water. Disinfection with chlorid of lime, copperas, or other agent, together with frequent change of water, are imperative.

The **lukewarm bath** (80° to 90° F.) with the aid of soap has merely a cleansing effect in removing dead, scaly particles and fatty secretions of the skin, dirt, and sweat. The functions of the skin in eliminating waste matters in the sweat are thus favored and the work of the kidneys relieved to this extent. The common pimples (or acne) of youth are prevented to a considerable degree by daily cleanliness. The lukewarm bath is suitable for the elderly or those who do not react or are endangered by cold baths. It may be taken at any time, but preferably not directly after meals.

The Warm Bath (90° to 100° F.).—This may also be used for cleansing purposes, and is not likely to cause disturbance after meals, the temperature being so near that of the body. Warm baths conduce to sleep if taken before bedtime and followed by a glass of hot milk. The activity of the skin is favored, and persons with chronic kidney troubles and hardening of the arteries should have warm baths daily. After severe exertion warm baths tend to

remove muscular soreness and stiffness of the joints. One should not go outdoors in cold weather soon after a warm bath.

The Hot Bath (105° to 110° F.).—The layman is often advised not to take hot baths except by professional advice. This is rather absurd, as everybody takes them whether or no. But there is considerable danger, nevertheless, in hot baths for persons with weak hearts. The heat is depressing to the heart and dilates the blood-vessels of the skin, taking the blood away from the brain. This is just what occurs in fainting—lack of blood in the brain—and fainting may occur in the bath. Hot baths should not be taken after meals (blood is drawn away from the digestive organs) nor before going out into the cold. Hot baths are useful in preventing colds after exposure to cold and chilling. They relieve intense pain, as in renal colic caused by the passage of stone from the kidney, and will stop convulsions in children. Hot baths are also used to cause sweating in many cases of poisoning from insufficient action of the kidneys; but where patients are weak in such conditions hot blankets are usually wrapped about them in bed. In taking a hot bath before bedtime a cold cloth should be worn on the head to prevent insomnia.

The Turkish Bath and Hot-air Cabinet Baths.—Boxes or cabinets are often used in public bath places and at home in which a person sits tightly enclosed (in a nude state), with the head out in the air of the room. These cabinets are heated by dry air from electric lights or steam pipes, or moist air is used by the evaporation of boiling water over a lamp, as in folding cabinets for home use. The object is to produce excessive sweating for the prevention of cold, treatment of Bright's disease of the kidneys, rheumatism, etc. A cold cloth should be worn on the head. A person may remain in the cabinet for twenty

or thirty minutes, providing the heat is not too oppressive. An attendant should always be at hand. In a Turkish bath a hot-air bath is given at 120° to 170° F., the subject breathing the air. This is followed by a hot shower and massage in a room filled with hot, moist air (100° to 110° F.), and then by a warm shower changing to cold, with thorough rubbing and drying. Turkish and Russian baths are depressing to the circulation, as are all hot baths, and should not be taken by very stout persons or those with weak hearts. Exposure to cold is dangerous after such baths, and for that reason hot baths are best taken at home. If taken elsewhere in cold weather one should return home in a closed conveyance. Some forms of rheumatism and stiffness of the muscles and joints after severe exercise are much benefited by hot baths, but the dry, hot air of a cabinet is less depressing and exhausting than the moist air, especially where one has to breathe it, as in the Turkish bath room.

VENTILATION

A word about ventilation may not be amiss. The older ideas concerning ventilation have been gradually slipping away, especially the belief that the exhalation of carbonic acid gas from the lungs, and corresponding consumption of oxygen by occupants of a room, is the chief cause of bad air in crowded apartments. Leonard Hill's startling experiment with a group of persons in an air-tight chamber, in which the oxygen was used up until matches would not burn, should be sufficient to shatter the carbonic acid poisoning theory. The occupants laughed and chatted while vainly endeavoring to light cigarettes, but remained perfectly comfortable so long as the air was kept cool.

Modern conceptions of ventilation are based on two fundamental experiments: "First, that subjects immured

in close chambers and exposed to the heat, as well as the chemical products found therein, are not at all relieved by breathing pure outside air through a tube. Second, that they are completely relieved by keeping the air artificially cooled without changing the air at all, and are relieved to a considerable extent by the mere cooling effect of the electric fan." The stale air of crowded and ill-ventilated rooms is chiefly air which has become overheated and oversaturated with moisture through radiation from its human occupants. Good ventilation means primarily and essentially constant movement of cool air.

The matter of the best degree of moisture in air is at present unsettled. Very dry air, as from hot-air furnaces containing an insufficient amount of water from evaporating pans, is notoriously harmful to the mucous membranes and predisposes to catarrh. A temperature over 65° or 70° F. lessens the comfort and efficiency in work and causes slight increase in body heat and rise in pulse-rate. There is still another element in connection with ventilation, and this is the exhalations from the mouths, bodies, and clothes of individuals in crowded rooms, which aid in making the air stale and unpleasant. Of just what these emanations consist is unknown, but, while they are often not perceived by occupants of a room, they become very objectionable to the outsider entering a crowded apartment. Bad air of ill-ventilated rooms resolves itself chiefly into overheated and overmoist air having insufficient movement. It is corrected by reducing the temperature below 70° F. and by affording some means of generating a current of air. Emanations from many individuals also play a less important part in the production of a stale or foul atmosphere.

THE COMPLEXION

There is a vast deal of nonsense in the idea fostered by advertising that great discrimination is necessary in the selection of a toilet soap. As a matter of fact, it is not best to use soap at all, habitually, on the face unless the skin is oily or soiled. One toilet soap is about as good as another if it is a pure soap. Soaps are made by boiling fats of different kinds with alkalies. The cheaper soaps, as yellow laundry soaps, contain an excess of alkali which is useful in removing dirt from clothes, but irritates, roughens, and dries the skin by removing its natural oily secretion. Plain castile soap or any of the more expensive soaps have little or no free alkali and are equally serviceable. Medicated soaps have not much value because the soap is in contact with the skin such a short time. Some persons find special soaps agree with their particular skins more than others, as the French Societé Hygiénique soap (plain), for instance. Cold water should be used on the face, as it gives color, improves tone, and tends to prevent wrinkles. Warm water relaxes the skin and favors chapping on exposure to cold. The various proprietary toilet preparations for application to the face are usually harmless, and may afford much satisfaction to the users and peculiar profit to the maker, but, as a rule, are wholly unnecessary. The application each night of cold cream to the face by thorough rubbing will preserve the complexion clear and free from wrinkles better than any other application, and the same is useful to prevent chapping of the skin of the face or hands in winter. In summer the use of rice powder on the face will tend to absorb perspiration and prevent sunburn. The proprietary face powders are much more expensive and no more effective, while the same remarks apply to the face creams as compared to cold cream.

Freckles due to a deposit of pigment in the skin may be caused by exposure to the sun, when they go away spontaneously. Then there are permanent freckles, more often in blondes, owing to some inborn peculiarity of the skin. To prevent freckles the skin must be protected from the sun by some covering as a hat, veil, or gloves, or covered with brown grease paint. For the removal of freckles white precipitate ointment may be applied each night. To prevent and cure sunburn nothing is better than an application of calamine lotion, and is more agreeable than the brown grease paint, also efficient as a preventive. Both the precipitate ointment and calamine lotion are kept by all druggists.

Acne.—In acne there are pin-head and larger sharp-pointed pink or reddish pimples with a central opening often containing a black speck. These are accumulations of the naturally greasy secretion in the pores of the skin, causing irritation of the surrounding integument. Sometimes the pimples contain matter and become as large as a pea. Acne pimples occur on the face, shoulders, chest, and back. The disease first appears somewhere between the twelfth and fifteenth years, and usually disappears between the twenty-third and thirtieth years. General care of the health does much to prevent and cure the disease. The bowels should move daily (see Constipation, page 260). A cold bath should be taken daily, followed by vigorous rubbing, or a warm bath for those not able to take a cold one.

Regular exercise outdoors is also imperative in play or sports, as bicycling, riding horseback, rowing, etc. Diet is of great importance. Candy, pastry, cakes, and pies should be forbidden, also tea and coffee. If the patient is thin or debilitated and pale, he must be built up with good nourishing food, as cream, milk, and butter. Cereals are

valuable, with the exception of oatmeal, which sometimes seems to favor acne. Green soap and water should be applied to the face every night, and after the face is dried the writer has found that the application of a proprietary preparation, Dermatone, is very effective in curing the disease.

Alkaline mineral water is also useful and a quart bottle of Vichy Celestins may be taken daily. In place of this, six or eight glasses of water, with a pinch of salaratus in each, may be drunk to advantage each day.

THE HAIR

Baldness and Dandruff.—Dandruff is the commonest cause of baldness. Dandruff is a germ disease in itself (Seborrhea sicca) which is contagious. After a period of two to seven years of dandruff and dryness of the hair, occurring between the twentieth and thirtieth years, baldness begins. As the baldness increases, usually at the top of the head, the dandruff diminishes. Not everyone with dandruff becomes bald, but baldness is the probable result, especially in men. In dandruff the germ ultimately destroys the roots of the hairs, which then fall out. Prevention is most important. One should not wear other people's headgear or use their brush and comb so as to convey the germ from diseased scalps to one's own. Lassar reproduced dandruff in guinea-pigs by rubbing the scales from a diseased human scalp into the backs of these animals.

To cure baldness it is first essential to prevent or cure dandruff, and the baldness will then be cured or will fail to progress. A hair wash should be used with which to thoroughly shampoo the scalp night and morning until the dandruff disappears. If the dandruff returns, the wash should be again applied. It is possible that dust may transmit the germ

of dandruff. The wash is composed of mercury bichlorid, 10 grains; glycerin, 1 dram; alcohol (70 per cent.), 8 ounces. This is poisonous if swallowed. If the skin of the scalp becomes too dry, a little sulphur ointment may be rubbed in night and morning in place of the wash. The scalp may occasionally be washed with tincture of green soap. Most hair tonics and pomades are of no value, being founded on the older idea that the scalp needs stimulating in baldness. Of course, there are other causes of baldness than dandruff, but it has been authoritatively stated (Jackson) that 70 per cent. of all cases of baldness result from dandruff, although there is undoubtedly an inherited lack of resistance to this infection.

Constant wetting of the hair is undesirable. Frequent cutting stimulates the growth of hair, but does not increase the number of hairs. Barbers are prone to advise singeing to make the hair grow thicker, but it has no action of this kind.

There is undoubtedly danger of contracting serious infections from the barber shop. Syphilis may be communicated from a razor not thoroughly sterilized. Several germ and parasitic skin diseases may be conveyed from patients by barbers to other customers through the medium of the razor, scissors, brush and comb, and moist towels. These include the germ disease dandruff from brush and comb, also barber's itch, an eruption on the bearded chin and upper lip of inflamed pimples containing matter or pus. This disease is contagious by means of pus germs (staphylococci). Ringworm of the face is due not to a worm, but to a vegetable parasitic fungus. It occurs as circular, partly bald patches on the chin, or as scaly or weeping reddish lumps arranged in a circle, on which the hair is more or less wanting. This disease may be contracted from the barber. Besides dandruff, barber's itch,

and ringworm, it is possible that boils and carbuncles may be transmitted by the barber's appliances from one person to another. The only way to surely avoid these troubles at a barber shop is to furnish all one's own materials—razor, soap, brushes, and comb—and to have only a clean dry towel used on the face.

It is not safe to rely upon barbers' methods of sterilizing their utensils.

FINGER- AND TOE-NAILS

While the finger-nails should be cut so that they will follow in outline the contour of the fingers, it is best to trim the toe-nails in a straight line across the ends of the toes to better prevent the effects of pressure on them by the boots.

CHAPTER IV

GERM DISEASES

Vaccination, Small-pox, Typhoid Fever, Asiatic Cholera, Dysentery, Diphtheria, Hydrophobia, Lockjaw, Scarlet Fever, Measles, Mumps, Whooping-cough, Bubonic Plague.

VACCINATION AND SMALL-POX

THE most successful examples of vaccination against germ diseases at the present time include vaccination for small-pox, typhoid fever, diphtheria, lockjaw, hydrophobia, dysentery, cholera, plague, cerebrospinal meningitis. It might at first sight appear disheartening to find many persons and sects still actively opposing vaccination for small-pox after considerably more than a century's absolute proof of its efficacy. But this very fact is a natural result of the success of vaccination in almost eradicating one of the most fearful scourges of mankind (Magna Pesta), responsible formerly for nearly half a million deaths in Europe alone. In 1760 it was estimated that small-pox carried off from one-thirteenth to one-fourteenth of each generation, and but one person in twenty escaped the disease before the days of vaccination. So that at the present time the foolish may safely combat vaccination without being punished for their folly by taking small-pox. But the deluded are not by any means always born idiots, for Herbert Spencer late in life wrote an essay attempting to prove vaccination a fallacy.

Lady Wortley Montagu, in 1718, introduced from Asia into Europe the practice of inserting matter from the

small-pox eruption into scratches made in the skin of susceptible persons, and by so doing reduced the death-rate to 1 per cent., but at the same time greatly increased the prevalence of the disease in a mild form. It had long been known in England and elsewhere that accidental inoculation with cowpox while milking would render the inoculated person safe from small-pox.

Acting on this knowledge, in 1774 Benjamin Jesty, a Dorsetshire farmer, who had himself escaped small-pox by acquiring the cow disease, proceeded to rub some of the matter from the cow eruption into scratches in the skin of his wife and his two infants, who remained proof against small-pox. This is the first recorded instance of vaccination. Again, in 1791, Peter Plett, in Holstein, having seen doctors inoculate small-pox into people, and knowing the accepted tradition that milkers who had acquired cowpox were safe from small-pox, tried the experiment himself of inoculating cowpox. Being tutor in a family, he had the temerity to transfer the matter from the eruption of cowpox into incisions, made with a pocket knife, on the back of the hands of his three pupils. But so successful was this rough-and-ready experiment that three years later these vaccinated children were the only ones spared in an outbreak of small-pox.

Jenner is given the credit of being the originator of vaccination, but while this is not so, he is justly regarded as the author or father of vaccination because it was he who first introduced it to mankind, and his was the conception that by this method small-pox might be abolished from the world, and to it he devoted his life and strength. His first successful vaccination was in 1796.

Cowpox is generally regarded as a form of small-pox modified by passing through the cow. The disease attacks chiefly young cows, is mild, and the eruption, similar to

that seen on the vaccinated arm of a man, is commonly confined to the udder. The vaccine matter is obtained by inoculating the bellies of calves with vaccine matter taken from other calves or from vaccinated human beings, which has been examined microscopically to prove its absence from harmful germs. The matter having been rubbed into scratches on the clean skin of the calf, the eruption is scraped off between the fourth and sixth day, and this material is then ground in a machine and mixed with glycerin to kill all germs, except those of cowpox.

The calf is killed and examined carefully to prove its healthy condition. A successful vaccination will invariably afford protection against small-pox after eight to eleven days from the time of vaccination. As small-pox requires from nine to twelve days to develop, one may avoid small-pox if vaccinated within the first three or four days after exposure, and even if vaccination be delayed for a week the small-pox will be of a mild character. Practically nobody is immune to vaccination, but it is not safe to infer that because a vaccination or revaccination does not "take," the person is immune to small-pox.

It will naturally be asked How long does vaccination protect one from small-pox? This cannot be answered by any stated period, because it is variable, from months to many years. The safest method to pursue is that in which children are vaccinated between the ages of six months and two years; again, when they enter school; and a third time within a period of ten years, and after this whenever there is special danger. A simple test has recently been used to show if a person is immune to small-pox at any period following successful vaccination. A drop of vaccine is rubbed into a single small scratch in the skin. If the person is immune, a red area will surround the scratch within twenty-four hours, which may increase within forty-eight hours,

and then rapidly fade away. This is called the "immunity reaction." Compulsory vaccination and revaccination should be required in all states, and has been upheld by the Supreme Court of the United States.

The dangers of vaccination are frequently exaggerated, and "compulsory school attendance is far more dangerous than compulsory vaccination." The death-rate in Germany has been 3.5 in every million vaccinated. Almost all the severe cases of complication after vaccination are avoidable, being due to local infection from carelessness of the doctor or patient in caring for the wound. Vaccination is a surgical procedure and should always be carried out as such. The arm should be vaccinated and not the leg, unless the patient remains in bed during the course of the vaccination, since inflammation of a serious character will often follow. The arm should be washed with soap and water, and then with alcohol, and the skin allowed to dry before the vaccination is done.

Three scratches an inch long and three-quarters of an inch apart, but not deep enough to draw blood in large drops, are to be made with a sharp sterilized knife. Cross scratches near together are forbidden in Germany, because a scab will then form, which causes irritation, scratching, and infection. A light dressing of six layers of sterile gauze should be kept over the vaccination by strips of adhesive plaster to protect it from unclean clothing.

It may be superfluous to give facts which may be used to refute the unbelievers in vaccination, but as more than 40 per cent. of adults are unvaccinated in some states and a large proportion of the remaining 60 per cent. are not properly vaccinated, it should not be amiss. The classical example in this country is that of Benjamin Waterhouse, Professor of Physics at Harvard, who on July 8, 1800, first introduced vaccination into the United States by vac-

cinating seven of his own children. In Boston, in 1802, 19 boys were vaccinated, and almost two months later 12 of these boys were inoculated with small-pox; nothing followed. At the same time 2 unvaccinated boys were inoculated with small-pox and both took the disease. Finally, the whole 19 vaccinated children were again inoculated from matter taken from the fresh eruptions from the two boys with small-pox, but small-pox did not follow in any single case.

"This is one of the most crucial experiments in the history of vaccination, and fully justified the conclusion of the (Boston) Board of Health—'cowpox is a complete security against small-pox'" (Osler). There is not the slightest danger for one recently and successfully vaccinated in caring for small-pox patients, and newspaper heroism is thus easily acquired. A modern instance of the success of vaccination is seen in the Philippines since our occupation. After 1907 systematic vaccination in the six provinces near Manila (with a population of over a million, and having from time immemorial a death-rate of over 6000 from small-pox) has resulted in no death in the successfully vaccinated and but a few scattered cases of small-pox. Small-pox attacking a person who has been vaccinated within five or six years is usually of a mild type and is called "varioloid." Pitting rarely occurs in these cases, but occasionally small-pox appearing within a few years after vaccination is severe and even fatal.

Vaccination is, then, the chief preventive means against small-pox. In addition, isolation of the sick in a guarded house or in a hospital, and vaccination of exposed persons, who should be watched daily for two weeks, are essential. The patient's discharges should be covered with 1 part of chlorid of lime in 8 parts of water, and the attendants not be permitted to leave the premises. After

the disease has terminated the mattresses should be burned and the bedding and clothing boiled for half an hour. It is being generally accepted by medical authorities that the contagious eruptive skin diseases, as scarlet fever, measles, and small-pox, are chiefly communicated by the secretions of the eyes, nose, skin and throat, and by direct contact of persons with these secretions—not through the air by means of scales or some imaginary emanation from the skin. If every one were properly vaccinated small-pox would disappear, and an adult acquiring the disease now-a-days should rather be regarded as an object of shame, and might not unfairly be subject to fine or punishment.

TYPHOID FEVER

Vaccination against typhoid fever is now the most important means of prevention, but one which has not yet been popularly appreciated and accepted. The principle of vaccination is that by the injection under the skin of dead germs of typhoid fever there is a production in the patient of antibodies, thus affording an active immunity to the disease such as occurs after an attack of typhoid fever.

It is rare that persons have typhoid fever more than once, but occasionally second and third attacks occur. In 1897 Sir A. E. Wright vaccinated 17 persons against typhoid fever, and was the first at this time to recommend the treatment as a general preventive measure against typhoid fever. In the preparation of this vaccine the typhoid fever germs are grown on suitable media, and then mixed with salt solution and killed by exposure to heat (129.2° F.) for one hour, when they are further diluted with salt solution to a standard strength, a small amount of antiseptic is added, and a dose of some 500,000,000 or 1,000,000,000 dead germs is put up in hermetically sealed

glass tubes. The vaccine is tested to show its freedom from living germs, and by injection into animals to prove its immunizing strength and freedom from harmful germs, especially those of lockjaw. Three doses are injected under the skin at about the site of ordinary vaccination of the arm, at intervals of seven to ten days, using a dose of 500,000,000 the first time and 1,000,000,000 of the dead germs at each of the later injections. There is some swelling and redness at the site of the injections, and there may be fever, headache, nausea, and a feeling of weariness for a short time after the injections, but no dangerous or fatal result has occurred in the hundreds of thousands of persons so treated. In about two-thirds of the cases there are no general symptoms produced. The injection is made in the late afternoon, and neither alcohol nor violent exercise should be taken thereafter.

Typhoid fever has often been more fatal than bullets in war. Thus in the Boer War over 7000 died through wounds and over 8000 by typhoid. Of our troops in the Spanish-American War, 243 died of wounds and 1580 perished of typhoid fever.

Before typhoid vaccination began there were 10,759 soldiers at camp at Jacksonville in 1898, and over 2000 cases of typhoid with 248 deaths.

After vaccination there were 12,801 troops at San Antonio, under approximately the same conditions and length of time, with only 2 cases and no deaths. Since 1911 vaccination has been compulsory throughout the United States Army in persons under forty-five years of age. Among 80,000 to 90,000 persons thus vaccinated there were but 3 cases of typhoid fever in 1913 and no deaths, as against several hundred cases in previous years, with from 22 to 74 deaths. Owing to vaccination, for the first time in 1913 in any army no deaths from typhoid fever

occurred in the United States troops. Typhoid vaccine is now supplied free in many states, and its use in civil life should become general and customary.

All children and young adults should be vaccinated, as typhoid fever is a disease of the young, and vaccination is less disturbing to children, rarely keeping them from school or play. The dose is regulated by their weight. Vaccination is especially indicated for all colleges, institutions, and boarding schools, and particularly in hospitals and dispensaries for doctors, nurses, and attendants. Travelers in the country and in unsanitary cities, inhabitants of typhoid-ridden regions, and for all campers the use of vaccination as a preventive for typhoid should be the rule.

At present it is not known how long the protection against typhoid fever, conferred by the vaccination, will last. In the army revaccination against typhoid fever and small-pox is required on enlistment every four years, but it is hoped that but three vaccinations during life, as advised in the case of small-pox, will be necessary to protect an individual for life against typhoid. Typhoid vaccination is as important as vaccination against small-pox, and there is sufficient evidence to recommend it for all healthy children and young adults in any part of the United States.

How We Take Typhoid Fever and Means of Avoiding It.—While the prevalence of typhoid fever in the United States is perhaps half what it was forty years ago, yet it is two to five times higher than it is in enlightened European countries today. As every case of typhoid depends, in the last analysis, upon the direct or indirect transmission of typhoid germs from the excrement or urine of patients (or carriers of germs) by "food, fingers, or flies," to a susceptible person, the disposal of excretions

becomes of chief importance. In cities this is the main object of a public sewage system, since not only the germs of typhoid fever but those of dysentery, diarrhea, cholera, and (rarely) tuberculosis, together with the eggs of roundworm, tapeworm, and hookworm are transmitted to man by means of the excrement. Indeed, if typhoid germs were kept out of every human body for eighteen months it is probable that the human disease would forever disappear.

In the country districts the care of human excretions is in the hands of individuals. Here human excreta may contaminate wells by leaking out of privies into surface soil and thus into loosely capped wells. It may be disseminated by the feet of humans and animals when on the surface of the ground, and it may pollute milk and other food through soiled fingers and flies, or by direct contact, when human excrement is used for manure in growing vegetables eaten raw, as strawberries, lettuce, radishes, etc.

The proper construction of privies becomes then of prime importance. They should be fly-proof and the receptacle for the excreta should be water-tight. The privy must have a tight roof, sides, door, and floor to exclude flies. Air-holes for ventilation, in the sides near the top, should be screened for the same reason. On the tight floor is erected the seat. The front of the seat is hinged so as to open. Through this opening is placed a large galvanized iron pail under the hole in the seat. The front of the seat is then closed and fastened until it is necessary to empty the receptacle. The hole in the seat must be always tightly covered when not in use, to keep flies from contact with the excretions. This is accomplished by causing the cover to automatically fall when not resting against the back of the occupant. A projection from the back wall of the privy will hold the cover forward so as to rest upon the back of the occupant of the seat.

When the person rises the cover, therefore, falls by gravity, and a careless individual cannot leave the seat uncovered. The contents of the receptacle may be kept fairly odorless by scattering dry earth on it each time the closet is used. When the pail is full of excrement it should be buried more than 18 inches deep and covered with lime. Human excrement should not be used for manure.

The germs of typhoid fever enter the body through the mouth in food and water contaminated with excrement or urine of typhoid patients.

Typhoid fever is not communicated from the sick to persons merely entering the room of the patient, but attendants who handle the patient's body, his clothing, and vessels containing his discharges often acquire the disease by soiling their hands and thus their food. By sterilizing everything after contact with the patient, even boiling his bath water, by covering the discharges with 1 part of freshly slaked lime in 8 parts of water for an hour, and by the attendants wearing rubber gloves and long-sleeved aprons, communication through contact with the patient may be averted.

Water and milk are the chief sources of typhoid fever. The Chinese never drink raw milk or unboiled water and rarely have typhoid fever, while the disease is common among the white people living in China—a commentary on our civilization. Milk is the most common cause of typhoid fever in cities having a good water-supply (see page 284). Typhoid germs are conveyed to milk by patients or "carriers," persons who have recovered from the fever, but excrete germs in their urine and excrement for months or years afterward. Four per cent. of typhoid convalescents become "carriers."

Typhoid germs enter water from sewage, privies, and surface-water contaminated with the discharges of typhoid

patients. Typhoid fever germs usually perish in filthy water within two days or a week, but may live in still water in reservoirs and wells for several months, and in ice as long as three months. Most large cities in civilized countries have an unpolluted water-supply, otherwise one must only drink boiled water.

Raw vegetables soiled by contaminated water or human excrement or by handling, and raw oysters taken from beds polluted by sewage are occasional sources of typhoid fever. Flies are common carriers in camps and elsewhere, flying directly from typhoid discharges to alight on food. They were the great sources of the disease in the southern camps of our troops in the Spanish-American War. In camps where large amounts of contaminated dust may settle on the food we have another possible source of typhoid infection. Then there are the human "carriers," noted above, who live among us for years unsuspected and innocent of their malign influence until some energetic health officer traces an outbreak of typhoid fever to the unfortunate cook, waiter, or dairy employee or other "carrier" engaged in handling food.

It has recently been stated by Lumsden (United States Public Health Service, May, 1915) that the use of typhoid vaccine lessens the susceptibility to typhoid fever by 75 per cent. or more, yet persons so protected may succumb to an enormous number of typhoid germs such as may be found in milk contaminated by the infection. Therefore typhoid vaccination cannot wholly supplant sanitary preventive measures. The susceptibility to typhoid fever differs in the same individual at different times and does not depend upon general robustness. When numbers of persons drink the same water containing typhoid germs perhaps only 1 in 10 or 1 in 100 will take typhoid fever, so that susceptibility is an important factor.

ASIATIC CHOLERA

Cholera is a disease in which the infecting germ always enters the mouth in food or drink, inhabits the intestines, and passes away in the bowel discharges. It is similar in these respects to dysentery and typhoid fever, and, in fact, cholera is no more contagious than typhoid fever, according to Osler. India has been the home of the disease from time immemorial, and not until the nineteenth century did it invade Europe. While cholera is frequently brought to seaports in the United States and Great Britain, it is easily kept from spreading by modern methods of sanitary control. Within recent times cholera has been prevalent in the near and far East, India, Russia, Italy, North Africa, Asia Minor, Arabia, and Turkey. While cholera was one of the most common diseases in the Philippines after the American occupation, it has been almost extinguished by our Public Health Service.

The disease is transmitted by the germs escaping in the bowel discharges of the sick, convalescent, and the apparently healthy, who may act as "carriers." Eight per cent. of 376 healthy persons were found to be carriers in Manila. Here, again, cholera infection is transmitted precisely as in typhoid fever, water being the commonest medium of infection; then raw food of all kinds which has become contaminated with infected water, flies from bowel discharges, or fingers soiled by handling patients, or from the personal discharges in carriers. Unboiled milk, cheese, and butter are frequent sources of infection; also raw fruits, salads, and vegetables, as lettuce, water cress. Cholera germs may live on butter, bread, or fresh meat for a week, so that the eating of recently cooked food and drink (including water and milk) must be insisted upon during cholera epidemics. The boiling of all utensils used to prepare, hold, or serve food is also essential. Some thick-

skinned fruits and vegetables may be eaten with safety after immersing them in boiling water a few moments, as oranges, apples, tomatoes, and mangoes. The hands must be frequently washed and always before eating, and the same care should be observed by cooks and waiters. All food should be carefully screened from flies.

Infection through air does not occur because cholera germs are readily killed by drying. Mineral waters obtained from cholera-free regions and boiled water, or milk, tea, coffee, and chocolate are, of course, allowable. The use of alcohol favors cholera infection and any food which irritates the digestive tract and leads to diarrhea. Indigestible food, an excessive amount of fruit, fruit juices, or cream are thus harmful in cholera-infected regions. Constipation may be relieved by rectal injections. Chilling of the body, worry, overexertion, and fright make persons more susceptible to cholera.

A flannel bandage should be worn continually about the abdomen to prevent diarrhea. There is not much danger to persons during a cholera epidemic if they can follow out these precautions. Even doctors and nurses who are constantly exposed to cholera do not frequently take it, while those handling soiled clothes in laundries are especially prone to infection.

Vaccines, consisting of both living and dead cholera germs, are injected under the skin to prevent the disease and diminish the mortality in those of the inoculated who do acquire it. The vaccines appear to greatly lessen the chances of infection in cholera epidemics, and also to very considerably lower the mortality in the inoculated, but produce considerable local and general disturbance. They have, however, been used quite extensively and successfully in the Philippines, India, and Russia. After taking cholera germs into the digestive tract from two to

five days are required to develop the disease. In many cases no symptoms are produced, and these vary from the mildest diarrhea to the constant draining away of rice-water discharges and collapse. Isolation of those sick with cholera and the most careful disinfection of their discharges and clothing and cleanliness of the hands are practised precisely as recommended in the care of typhoid patients (see page 80) to prevent contagion from cholera patients. Microscopic examination of the bowel discharges of suspicious persons with diarrhea will determine the existence of the cholera germs.

DYSENTERY

Dysentery is acquired like typhoid fever through water or food containing the dysentery germs escaping from the bowels of patients. Again, like typhoid fever, it may be acquired by persons who handle the patient's body, clothing, and vessels holding his discharges. More often the disease is taken by drinking contaminated well-water in the country or other polluted drinking-water, or by bathing in polluted streams.

Dysentery is the great destroyer of life in the tropics and is common in summer in temperate regions, particularly in military camps and institutions, and as the "summer diarrhea" of children. The laity often call any severe diarrhea dysentery, but true dysentery begins with diarrhea or loose movements of the bowels, together with fever, loss of appetite, weakness and pains in the bowels, and then the true dysenteric symptoms are seen. These consist in painful straining and the passage of slime and blood.

Milk is a common means of transmitting the disease through polluted water used in washing milk utensils. Flies also carry the germs directly from the bowel movements of patients to food. Then, again, persons who have

dysentery in a very severe form and recover may harbor the germs in their bodies for a long time and even carry them over from one warm season to another. In other words, we have dysentery carriers as well as typhoid carriers. Raw vegetables may also be sources of infection when saturated with polluted water. The means of prevention are precisely those outlined for typhoid fever; that is, the drinking of boiled water and milk, and the avoidance of raw vegetables and fruits growing on the ground, as strawberries, the observance of the same care in the handling of dysentery patients and their bowel discharges, and, finally, the use of a vaccine in epidemics in the case of those much exposed. The vaccine is made from cultures of the dysentery germs in the same manner as typhoid vaccine and administered in the same doses subcutaneously. It will, however, only protect the individual for from eight to ten weeks against infection with dysentery. A serum prepared like that used in diphtheria is of great value in the treatment of this disease.

We have been speaking of the more common form of dysentery, or bacillary dysentery, as it is technically called. There is another form, the amebic dysentery, common also in tropical countries, in India, Egypt, the Philippines and Southern United States, and rarely throughout this country. This form of dysentery is more apt to be chronic and is not so prone to occur with the suddenness and fever of the more common tropical or bacillary dysentery; but the disease is produced by the lowest form of animal life—the ameba—which can readily be seen in the bowel discharges under the microscope, and this test is the only real means of separating the two forms of dysentery. Liver abscess is one of the common complications of the amebic form of dysentery. The treatment by subcutaneous injections of the active ingredient of ipecac (emetin) and in-

jections into the bowels of pure kerosene is quite different from that for bacillary dysentery. As water appears to be the chief carrier of the ameba, the precautions to be adopted in the prevention of amebic dysentery are the same as those for typhoid fever and bacillary dysentery. It is important to avoid agents which may irritate the bowel, and so offer a favorable field for the growth of dysentery germs in warm weather; these include the small fruits and unripe fruits, coarse cereals, and rye or whole wheat bread, and powerful cathartics.

DIPHTHERIA

It has been found that persons are much more resistant to diphtheria at some ages than at others. Thus, by means of the Schick test, it appears that at birth 80 per cent. of infants are immune, and as high as 90 per cent. of adults, while of children from one to five years but 40 to 50 per cent. are immune. Since the discovery of antitoxin it has been used in an enormous number of cases to prevent diphtheria. The protection afforded by antitoxin lasts but about three weeks, however, and so its use must be repeated every three weeks, or it may be only given to exposed persons or to those who are about to be exposed.

It will be seen that young children are particularly susceptible and, therefore, those who most require such protection.

Briefly, antitoxin is the liquid portion of the blood (or the blood-serum) of horses which have been made immune against diphtheria.

Diphtheria germs are grown on the surface of broth, the germs are killed by adding an antiseptic, and then the filtered broth containing the poison (toxin) produced by the growth of the germs is injected into healthy young horses every few days in gradually increasing doses. After

several weeks of this treatment the animal is bled, the red cells are allowed to settle, and the clear, straw-colored serum is drawn off after the blood has stood awhile. This is antitoxin and must be tested as to its strength, which is stated in units. A unit is the smallest amount of this serum which will protect a guinea-pig from death after receiving a minimum fatal dose of diphtheria poison. To protect children from diphtheria a dose of antitoxin containing 1000 units should be injected under the skin, but in adults is is safer to inject some 3000 units for this purpose. In the actual treatment of diphtheria the dose is 2000 units in ordinary cases in children and 10,000 units in severe cases. For the treatment of diphtheria in adults the average dose is 10,000 units, and in severe cases 30,000 units, which is increased to 50,000 or 150,000 units in advanced and desperate cases. In either children or adults antitoxin is injected under the skin for protection or in the treatment of mild cases; in more severe cases it is injected deep into a muscle, and in serious cases it is injected immediately into a vein. It is rarely necessary to repeat doses of antitoxin when they are given in proper dosage at the onset.

There is considerable prejudice against antitoxin as a preventive in diphtheria, which, however, has but slight basis.

In the first place, it is practically a sure preventive of diphtheria after exposure if given at any time before the disease is manifest, and in larger doses an almost sure cure if given within the first few hours after the development of diphtheria. Thus, in New York, of 80,000 persons given antitoxin to prevent diphtheria, but 2 in 1000 developed the disease and but 1 died. The disadvantages of antitoxin are as follows: In from seven to ten days after its injection (rarely from one to twenty-one days) various forms of itching rashes appear in some cases, and they may

be accompanied by weariness, fever, vomiting, pain in the joints, and some swelling of the glands. These symptoms are usually not severe and disappear in three or four days. But rarely death has been caused by antitoxin under certain conditions, as when persons have previously received antitoxin after an interval of a week or any length of time greater than a week. Also in the case of persons subject to asthma, or those who are affected by the smell of horses, and in some children with enlarged glands. The fatalities are so unusual that in 40,000 cases given antitoxin at the Boston City Hospital none occurred.

But harm from the use of antitoxin may always be prevented by injecting but 2 drops and waiting three hours for any unpleasant symptoms, as this dose cannot be dangerous. After this time the regular dose may be given, or, if the small dose caused unpleasantness, the antitoxin may be injected in gradually increasing amounts. Such a course should always be pursued in persons who have formerly taken antitoxin, in those subject to asthma and sensitive to horses, and in any who may fear the treatment. The concentrated serum now used is much less likely to produce any rashes, as it is the amount of the horses' blood that causes trouble and it has nothing to do with the antitoxin.

In children's hospitals it is the custom to give all the patients antitoxin at regular intervals, to prevent the occurrence of diphtheria, and in the Boston Children's Hospital this has been done for years without any untoward result. While antitoxin is not usually regarded as a vaccine, yet any material inoculated into persons to prevent disease is a vaccine.

In cases of diphtheria the patient should remain in a room from which all the movables, as rugs and carpets, etc., have first been taken.

Dogs and cats should be excluded. Cats occasionally have the disease and dogs can carry diphtheria. The attendant should gargle her throat frequently with a saturated solution of boric acid or with listerine, but there is no preventive so sure as antitoxin. The nurse should have her hair covered with a cap and her dress by a long-sleeved gown, which should be left in the room when she leaves it. Everything taken from the room should be first boiled or soaked for an hour in 5 per cent. solution of carbolic acid. A person is more likely to catch the disease if the patient coughs or sneezes in his face. The disease is chiefly communicated by convalescents who go about before the germs have left their throats, or by exposed but healthy persons who may carry the germs in their throats without taking the disease. Quarantine is not removed nor the patient permitted to go abroad until officially released by the Board of Health when the throat is free from diphtheria germs.

Finally, the question arises, Shall every person who has by any possibility been exposed to diphtheria, or is likely to be exposed, be given a preventive dose of antitoxin? Most of the leading health authorities advise such a course, and this has been my rule unless special reasons to the contrary exist. In cases of unsanitary and crowded buildings, and in institutions for children, hospitals, asylums, and schools, when an epidemic of diphtheria threatens, all the inmates should be immunized. In private practice among the well-to-do it has been the custom of some leading physicians not to give antitoxin to adults who may have been exposed to diphtheria, and to keep exposed children under close observation and withhold antitoxin unless sore throat appears in them. Diphtheria requires from two to seven days to develop after exposure, more often only two days. But it seems to the writer that the safer course is to give

antitoxin to all persons who may have been exposed to diphtheria; the only objection is the inconvenience, there being no danger if the precautions already described are followed.

The new Schick test may allow us to forego the injection of antitoxin in adults slightly exposed, and is useful in institutions where large numbers of persons may need protection against an outbreak of diphtheria.

The Schick test informs us as to the susceptibility of a person to diphtheria. By its use, as stated above, some 90 per cent. of adults, 50 per cent. of children, and perhaps 80 per cent. of infants appear to be immune. Infants inherit antitoxin from their mothers, it passing into their circulation before birth. The antitoxin disappears to a considerable degree after the age of two or later, and so children then become largely susceptible to diphtheria. In later life there is again often immunity established by a previous mild and unrecognized attack of diphtheria. Carriers of diphtheria germs always give a negative Schick test and are always immune because of the large amount of antitoxin in their bodies. In active diphtheria the Schick test is aways positive, owing to a lack of antitoxin in the patient. The Schick test is valuable in persons who may be dangerously susceptible to antitoxin. But if it is negative in such persons, there will be no need for them to be given antitoxin since they are not susceptible to diphtheria. In the Schick test $1\frac{1}{2}$ drops of dilute diphtheria toxin are injected into the skin of a person. Directly a white spot appears at the site of the needle puncture, and if the individual is susceptible to diphtheria, some redness, swelling, and a pimple will appear at this point within twenty-four to forty-eight hours.

In persons not susceptible to diphtheria the antitoxin

in their bodies neutralizes the irritant effect on the skin of the toxin injected, and so no local inflammation occurs at the site of the injection. The toxin used in the test is a poison developed in the growth of diphtheria germs. It is standardized for the test, so that the human dose is equal to one-fiftieth of a fatal guinea-pig dose.

In children exposed to diphtheria it is safer to wipe off secretions from the throat for examination for the presence of the diphtheria germ. In adults not greatly exposed the Schick test may be used. By it about two-thirds of exposed adults will be found not to need antitoxin (Park). If a person has not recently been exposed to diphtheria, but is liable to future exposure, he may be given vaccine treatment which affords protection against diphtheria for one or two years, while antitoxin gives immunity for only ten days or so. The vaccine is a strong solution of diphtheria toxin neutralized by antitoxin, and is injected into the skin of the back. This method requires ten days to render a person immune, while antitoxin confers immediate immunity. No bad results followed the vaccination of 700 children against diphtheria. Owing to the short period of development of diphtheria—two to seven days after exposure—it is safer not to wait for the results of the Schick test, but to give a protective or immunizing dose of antitoxin as soon after exposure as possible, except in adults slightly exposed. But in those individuals subject to asthma, and in those who have had antitoxin on a previous occasion, and, therefore, may be poisoned by a second dose, the vaccine may be used as a safe and effective substitute for antitoxin as a protective agency against diphtheria.

HYDROPHOBIA

While hydrophobia is a comparatively rare disease in man, it would be much more common were it not for the Pasteur vaccination. The disease is greatly more frequent in dogs, and outbreaks have occurred in most states in the Union—and for the first time, recently, on the Pacific coast. In 1911, 4625 persons were treated for hydrophobia, that is, given the preventive treatment; and there were 98 deaths from the disease in the whole United States. It is curious that although hydrophobia has been known to exist since 300 B. C., there are many deluded persons who still deride its entity, and not so long ago an English writer stated that hydrophobia was a disease which attacks man and impels him to kill dogs.

Anyone who has observed hydrophobia in man or beast could as easily doubt its existence as one seeing a case of small-pox. The germs of the disease have not yet been isolated.

One should know in a general way the symptoms of madness or rabies in dogs to avoid the disease. The animal is altered in disposition and habits. He is sullen or very friendly, nervous, and restless, sees imaginary objects, and often shuns the light and hides. He frequently licks and swallows all kinds of objects and is subject to vomiting. Later he has difficulty in swallowing, and quite commonly he is thought to have a bone in his throat. Attempts to swallow water are constant and, in the later stages of the disease, this is impossible. In the second stage the animal leaves home and travels great distances, biting men, animals, and inanimate objects, often returning to die. The voice is changed into a hoarse howl, the tail droops, the head is depressed, with staring, glazed, bloodshot eyes, and the animal is insensible to pain, persons, or surroundings; the gait is unsteady and

the patient becomes emaciated and repulsive. Periods of excitement and biting occur in the presence of noises, animals, and men, alternating with exhaustion and quietude if the dog is not disturbed. The third stage is shown by exhaustion and paralysis of the hind parts and the lower jaw. The latter happens early in what is known as dumb rabies and the lower jaw drops, the tongue is dry and covered with stringy saliva, and there is inability to either bite, howl, or swallow. If the dog truly has rabies, death is almost invariably certain in from four to ten days, except in dumb rabies, when death may be more delayed. This form, known as "drop jaw," leads owners to think dogs have a bone in the throat. While they cannot bite, it is exceedingly dangerous to handle their mouths, for the saliva may infect the slightest abrasion of the hands, as about hang-nails.

When persons are bitten by a dog supposedly rabid a diagnosis is imperative. The surest way is to keep the animal caged for inspection where this is possible. His death and the examination of the brain will settle the diagnosis absolutely if the result is positive. If the suspected dog is alive and in good health after ten days rabies is highly improbable.

If the suspected animal runs away, dies, or is killed inside of ten days the Pasteur treatment is advisable unless laboratory examination of the brain of the animal can be made and is negative. Even this is not to be wholly relied upon in early stages of the disease, and if the animal has bitten several persons, or its actions have been suspicious, the treatment should be taken. It has been found that in 3 per cent. of truly rabid dogs the examination of the brain will not show evidences of the disease, so persons whose hands have been licked by rabid dogs should also take the

Pasteur treatment, as Park records 8 cases in which hydrophobia has been acquired in this manner.

The head and neck of a suspected animal should be sent on ice to a laboratory for examination if the dog has been killed or dies, or the brain and upper part of the spinal cord may be sent in glycerin and will keep much longer than if sent on ice.

The writer was able to locate by advertising the body of a dog which had been killed and buried a week after biting six persons, and examination of the animal's brain and inoculation of it into rabbits proved the disease to be rabies. Most of the bitten persons had already begun the Pasteur treatment and none developed hydrophobia.

The period required for development of the disease, after infliction of a bite, usually varies from two to eight weeks in man and dogs or, on the average, forty-nine days in man. The bites of rabid animals should be immediately burned with a hot iron or cauterized by fuming nitric acid, followed by a strong solution of saleratus in water and then by alcohol.

Or the tissue surrounding the bite should be cut away. Either of these methods are of value, even if they must be deferred as long as twenty-four hours, but the sooner treatment is begun the better. On the average, but 15 per cent. of persons bitten take hydrophobia. If the bare skin is bitten the chances of acquiring hydrophobia are much increased.

The Pasteur treatment should be begun as soon after receiving the bite as possible, and it is successful in preventing hydrophobia in 99 per cent. of persons recently bitten. The vaccine matter is prepared from the spinal cords of rabbits which have been given the disease, the germs being killed in part by drying the cords for varying periods of time. The cords which have been longest dried

are weakest and are first used, rubbed up with a little water, and injected under the skin.

The treatment is given daily for three weeks. Half a dozen manufacturing firms and the Hygienic Laboratory at Washington send out the vaccine by mail. Glycerin and carbolic acid are added as preservatives.

No harmful effects whatever follow the use of vaccine in the vast number of cases. Rarely local paralysis has been caused by the treatment, which may later disappear. In 4282 persons vaccinated for rabid dog bites by the New York City Health Department there were 7 cases of paralysis and 2 deaths attributable to the treatment. Hydrophobia is surely fatal. The latest figures are those of Simon, who finds paralysis occurs in 1 case in every 2177 persons treated. Since but 1 person in 200 treated develops hydrophobia, and since 30 (untreated) persons in 200 who have been bitten by mad dogs contract the disease and (always) die, the disadvantages of treatment are negligible. Animals who have been bitten by supposedly mad dogs should be immediately destroyed. The muzzling of dogs for six months within a radius of 20 miles from the location of the first case of rabies will stamp out the disease.

LOCKJAW

Lockjaw, or tetanus, is a rare disease, so that a physician seldom sees more that a case or two in a lifetime unless practising in a region in which the disease is indigenous. In this country lockjaw more frequently occurs in Long Island, Connecticut, the Hudson River Valley, and the Atlantic States. The germs naturally live in the intestines of horses, cattle, and dogs, and so dust and dirt contaminated with droppings from these animals are dangerous when they soil a wound. Lockjaw sometimes arises without the presence of any wound, but in that case it is thought that

some slight unperceived abrasion may have led to the infection. The germs and their spores are most difficult to kill, and live for years and years on inanimate objects. They exist in the soil, and especially in stable dirt. Then there are certain wounds which offer a favorable field for their entrance and growth. The germs of lockjaw do not grow well when exposed to air, so that punctured wounds, which are not freely opened to the air, are most dangerous, especially if made by a nail or sharp object entering the foot which has been contaminated with manure or stable dirt, or soil of any kind. The entrance of foreign bodies into the wound, as clothing, the wad of blank cartridges, or simply dirt, adds greatly to the likelihood of lockjaw. All wounds in which there is much bruising or tearing of the tissues and punctured wounds or those penetrating deeply, especially when contracted in the streets or about stables, are chiefly subject to lockjaw, and tetanus antitoxin is indicated.

The wounds are usually on the hands and feet. Before the general suppression of the Glorious Fourth-of-July an extraordinary number of cases of tetanus occurred from toy pistol wounds on these occasions.

There are three essentials in the treatment of such wounds. The first is thorough opening of deep, punctured wounds; and, second, washing them out thoroughly with boiled water or antiseptic solution and keeping them open by strips of sterilized gauze. When this is done, and a surgeon should always attend the case if possible, and may have to give an anesthetic, there is less danger of lockjaw. The third essential, especially in regions where lockjaw is known, is a dose of antitoxin given within a few hours after the injury, and it will almost invariably prevent the occurrence of the disease. The dose may be repeated at the end of ten days if there is a nasty wound

which may be still harboring tetanus germs and their poison. This is said to be over 100 times more powerful than strychnin, and to be, indeed, the most virulent of known poisons.

Tetanus antitoxin is made by injecting horses with gradually increasing doses of the poison developed by the germs of this disease, and at the end of four or five months some of their blood is withdrawn and, after the red portion settles, the upper, pale, straw-colored serum is removed and is called antitoxin, because it possesses antibodies elaborated in the horse which will neutralize the poison of lockjaw in man. It is injected in the same way as diphtheria antitoxin and is without danger, except as noted in that connection (see page 87).

Colonel Roosevelt was given a dose of tetanus antitoxin almost immediately after the attempt on his life, during one of his public addresses, because of the greatly bruised character of his wound, produced by the impact of the would-be assassin's bullet on his spectacle case, and thus on his chest.

SCARLET FEVER, SCARLATINA

Scarlatina is another name for scarlet fever and not a milder form of the disease, as the layman often appears to believe. Persons are not so susceptible to scarlet fever as to measles and many escape infection.

The disease is more fatal than measles, although not so much so in children as most persons think. The death-rate in 1000 cases at the Boston City Hospital was about 10 per cent. Most of the fatal cases occur in children under six years of age, and 90 per cent. under the age of ten, so that every protection must be afforded children. Infants at the breast are rarely attacked, however. The safest method is to send children who have not had the disease

out of the house as soon as a case of scarlet fever develops. Thus, Chapin found in Providence that, while over one-quarter of the children in houses containing a case of scarlet fever took the disease when they remained in their home, but 7 per cent. were affected when they were sent away. That is, some 50 of 1000 children sent from infected homes developed the disease when away, and 19 more came down with it when they returned.

The disease requires for its development—from time of exposure to the first appearance of sickness—from four to twenty days, oftenest ten to fourteen days.

Formerly the scales of skin during peeling were thought to be the medium for conveying the germs of scarlet fever. Now the secretions from nose, throat, and ears (when these run, as often happens from ear abscess) are considered the most important sources of contagion. Injection of the mucus from the nose and throat of scarlet fever patients under the skin of ten children reproduced severe cases of the disease in every child. But, the germ having not yet been identified, it is uncertain that the peeling skin is not also a medium for its transmission. Many persons have such mild attacks that they go about unsuspected and spread the disorder, while others communicate it during the last few days before they come down with the disease, and still others convey it during convalescence.

Such individuals may contaminate milk, and large outbreaks in cities have been traced to milk infected in this way. In Boston, in 1910, some 842 cases of scarlet fever suddenly occurred from drinking a contaminated milk in which the germs flourish. The only sure preventive is to drink milk properly pasteurized in the bottle, or boiled milk (see page 287). One epidemic was traced to a milkman who had a discharging sore on his finger following an attack of scarlet fever, and the discharge had evidently

contaminated the milk supply. Isolation of the patient in a room connected with an anteroom is the best precaution against spread of the disease. How long he shall stay there is at present uncertain—anywhere from three to nine weeks, according to different authorities. Four to six weeks' isolation are more commonly required in practice, or until all peeling and discharge from the nose, throat, ears, or other parts cease.

All unnecessary articles should be first removed from the sick room, especially such as cannot be readily disinfected, as books, curtains, rugs, upholstery, etc. There is slight danger of communication of the disease by the attendant if the case is well managed, but Chapin's figures show that this is not usually practicable. If the nurse wears a washable cap and gown covering her clothing, and thoroughly washes her hands and clothes, and leaves the gown and cap in the anteroom on leaving the patient, there is little danger of contagion. The father of the family under such conditions may go to business as usual. Thorough disinfection of the sick rooms with formalin and scraping off the wall paper and repapering, with burning of all unnecessary infected articles, should be done after the patient is well. Children who have been sent away should not return until at least two months from the beginning of the scarlet fever, and later if there is any likelihood of infection from catarrh in the nose or throat or discharge from the ear of the patient. Where disinfection cannot be done by a proper health board the formalin candles sold by druggists may be used, but at least twice the quantity recommended should be employed, and the room must be sealed tight (by pasting strips of paper over all cracks) for twelve hours while the fumigation is going on. Everything which comes out of the room must be first disinfected, either by boiling or soaking in 1 : 1000 solution of corrosive sublimate, or, in

the case of metals, a 5 per cent. solution of carbolic acid. Mattresses, pillows, and carpets are hard to disinfect except in municipal steam-sterilizing plants. Persons rarely have scarlet fever more than once, and many adults, as doctors who are constantly exposed, escape it altogether.

MEASLES

Measles is a disease every one is supposed to have, but this need not necessarily be if attempts at prevention were general. It is, indeed, true that no person and no age are immune, but more care should be taken to avoid exposure. This remark particularly applies to children who are made by measles much more susceptible to pneumonia, tuberculosis, rickets, etc.; but there appears to be a feeling among parents that it is just as well to allow children to acquire measles, because they will have it any way, and since it is more severe in adults. The contrary is actually the case, it having been shown that, in the same region and in the same class of people, the mortality from measles was 8.1 in children and but 1.3 among adults (Fürbringer). It is true that infants under six months are less often sufferers, but this is probably due to the fact that they are kept more secluded and not so apt to be exposed.

The period of development, from exposure to the beginning of the disease, is from "seven to eighteen days; oftenest fourteen days." Therefore, children who have been exposed should keep away from school for two weeks, and children living in the vicinity of measles should be sent away to avoid the contagion. Measles is peculiar, in that it is most contagious during three to four days before the eruption occurs, and the contagion dies out within three or four days after the appearance of the eruption. Whether there is any contagion from the patient during peeling is questionable. Experiments indicate there is not.

If parents isolated children just so soon as fever and other signs of any sickness appeared, on general principles, the opportunity for taking contagious diseases would be much curtailed.

This is notably important in measles, which comes on like a feverish cold, with running at the nose, sneezing, fever, cough, and sore eyes. A child or adult in this condition should be isolated in an airy room, with a temperature of 65° F., and all persons, especially children, should be kept out, except the attendant. The patient should stay in bed until the eruption has wholly gone, and in his room until all peeling is over, a period of from two to four weeks. The germs of measles live but two hours after they leave the body, so that disinfection of the sick room is unnecessary. Bathing of the patient and a twelve-hour airing of the room and its contents are sufficient protection to susceptible persons.

Second and even third attacks of measles are more common than in the case of any other contagious disease. The great fatality of measles among the natives of islands in which the disease is not indigenous is well known, as seen in Fiji, where over a quarter of the population died in four months from this disease, and in the Faroe Islands.

MUMPS

This disease is generally made light of by everybody except the patient. It differs from the other contagious diseases in having a long period of development—fourteen to twenty-four days, more usually about three weeks. Rarely the first symptoms have not shown themselves for thirty-six to forty-two days after exposure. Patients may give the disease to others for a few days before they become sick, and afterward for two to four weeks from the beginning of their sickness, so that it is safer to isolate children

for at least three weeks. As adult males are apt to have painful swelling of the testicles as a complication of mumps unless they keep quiet, they should stay in bed during the height of mumps and remain in the house for ten days. The pain and swelling in the region under and in front of the ears, which constitutes mumps, usually lasts for a week or ten days.

Disinfection of the sick room and its contents is not practised in mumps because the disease appears to be acquired by direct contact with a patient, and not with clothing and inanimate objects which may have been exposed to the sick. The disease is very rarely fatal, and then through some complication.

WHOOPING-COUGH

The public needs instruction concerning the prevention of whooping-cough more than in any other contagious disease. This follows, first, because less pains are taken to isolate patients than in the case of any other of the infectious disorders, and, second, because both the laity and profession appear to think and act as though whooping-cough were a mild and comparatively inconsequential disease.

As a matter of fact, whooping-cough is more fatal than either measles, scarlet fever, or diphtheria, if we include its complications, in children under five years of age. Nine out of every ten deaths from whooping-cough are due to pneumonia, and the severe coughing occasionally leads to death from bleeding into the brain (apoplexy) and starvation from vomiting, while deaths from heart failure and convulsions are not uncommon. Parents are shamefully responsible for permitting their children, suffering from whooping-cough, to play with other healthy young people. The reason this lapse is more frequent and possible than in

the case of other contagious diseases is that patients with whooping-cough are usually about and outdoors.

The whooping-cough germ has only recently been discovered and isolated. It appears to live in the mucus in the air-passages, where it may be found during the first few weeks of the disease. Precisely how long it may exist in the patient is not certain, but it apparently is not carried by healthy persons from the sick to the well, and there are no "carriers," as in the case of diphtheria, meningitis, etc. One attack protects an individual from another. Almost every one is susceptible and has the disease at some period of life. One-half the cases are under six years of age, but infants under six months are not so liable to the disease. There are about 10,000 deaths a year from whooping-cough, on the average, in the United States, and the death-rate is 5 to 15 in 100.

After exposure one to two weeks elapse before the symptoms begin. If more than two weeks pass after exposure without development of the disease there is little danger of its occurrence. Whooping-cough starts like an ordinary cold and cough, although the cough is more constant than usual at night. Unless whooping-cough is prevalent it is not possible to make a diagnosis until the second stage begins, after one or two weeks more. Then there are severe spells of coughing, four to twenty or more daily.

The child in one of these gives fifteen or twenty short coughs, grows blue, and appears to be suffocating, and then draws a long breath with a crowing sound (the whoop), and often ends by vomiting. The whooping stage may last an uncertain number of weeks. While children are best kept outdoors with the disease, they should not be permitted to play with well children until after six weeks and after all whooping and coughing of phlegm has ceased.

They should have a separate room to sleep in, and all material which is vomited or coughed up should be burned at once. Paper napkins and old clean cloths may be used for collecting secretions from the nose and mouth. While direct contact with the sick is usually the cause of contagion, yet the germs may be sprayed into the air in coughing and be carried about on clothing. There is a classical case in which clothing from a patient on a ship in St. Helena conveyed the disease to the children of a laundress on shore.

Quite recently a vaccine has been used made in much the same way as described for use in typhoid fever; that is, consisting of the dead germs of whooping-cough and injected under the skin. This appears to be of considerable value in protecting those exposed to whooping-cough from taking the disease. Hess (1914) reports that with the use of vaccine protection, in an epidemic of whooping-cough, 1 in 12 took the disease, while without it almost 3 out of 4 children became sick with the disorder.

It is without danger and should be tried. The New York Health Department has ardently advocated vaccination against whooping-cough.

Disinfection of the room should be done after the patient has recovered. The chief danger of pneumonia is during early convalescence.

PLAGUE. BUBONIC PLAGUE

Plague has been known from the second century, and in the fourteenth it destroyed one-fourth of the people of Europe, and was known as the "black death." It ravaged Europe again in the seventeenth century, but gradually died down, until it appeared again in Hong Kong in 1894.

There have been enormous losses from plague in India, some five and one-half millions dying of it in the United

Provinces, Bombay, and the Punjab between 1896 and 1911. Since that time the disease has occurred in the Far East, in Persia, Turkey in Asia, Java and Sumatra, and in Egypt and Japan.

There have been a few cases in England and the United States within the past few years, notably in San Francisco (121 cases in 1907–08), and a few cases in Seattle, and at the present writing (1914) an outbreak has just started in New Orleans. With the modern manner of handling the disease in the most civilized communities there appears to be little danger of a large epidemic of the disease.

Several forms of the disease occur. The most common begins with fever, headache, pain in the back and stiffness of the limbs, and enlarged glands (buboes), especially in the groins, appear from the third to fifth day. Some patients are so overwhelmed by the germs that they die within three days before the buboes form, and in the pneumonic type the disease is evidenced by a rapidly fatal form of inflammation of the lungs.

Plague is contagious in less than 3 per cent. of cases, and the contagion is seen only in the pneumonia cases crowded together in unsanitary conditions.

Bubonic plague is transmitted to man from rats and ground squirrels entirely by rat- or squirrel-fleas, and from rat to rat or squirrel to squirrel by the same insect. The disease is carried from place to place by rat-fleas on persons or their belongings. The rat-fleas may live a week when starved, but on human beings they may subsist three or four weeks. Rat-fleas do not naturally take to humans or other animals, and it is only when they are starved that they change their habitat, except in the case of ground squirrels, chipmunks, and a few other animals.

A single rat-flea may harbor as many as 500 plague germs in its body, and human epidemics usually follow severe

outbreaks in rats, as the terrible mortality in rats drives their fleas to the human host.

The cat- and dog-flea are apparently not invaded by the plague germ and so are not dangerous to man. On the contrary, in the Punjab it has been shown that where there are from 30 to 75 cats for every 100 houses, there is no plague, owing to the destruction of rats, and this method of fighting plague is prescribed by the scriptures of the Mohammedans and Hindus.

The modern way of fighting plague consists in poisoning and trapping rats and examining dead rats for plague germs, in disposal of food and garbage in rat-tight vessels, general cleansing and destruction of shacks, out-houses, and stables affording nests for rats, but particularly enforcement of rat-proof buildings, to make life impossible to rats through starvation. These measures have been splendidly carried out in the United States through the agency of the Public Health Service, often hampered as much as possible by the state and municipal lay authorities who were most concerned, as in California and Seattle. The appearance of dead rats in a seaport should immediately excite suspicion, and cultures from their bodies will decide the existence of plague germs, together with inoculation of guinea-pigs. Segregation of the sick, fumigation with sulphur of the premises and ships to destroy rats and fleas, and shields on the hawsers to prevent rats from boarding ships are essential. To protect individuals against plague there is Haffkine's vaccine, consisting of the dead bodies of the plague germs and harmless in itself. One injection of this reduces the chances of getting the disease four-fifths, while those who have had the injection and acquire the disease have two and one-half times the expectation of recovery as compared to the uninoculated (Martin).

CHAPTER V

GERM DISEASES ONLY COMMUNICATED BY THE BITES OF MOSQUITOES

Malaria, Yellow Fever, Dengue

MALARIA

Malaria is now known to be due to animal parasites (plasmodia) which are only transmitted to man by a particular kind of mosquito, the genus Anopheles, eight species of which act as hosts to plasmodia. The mosquitoes, in

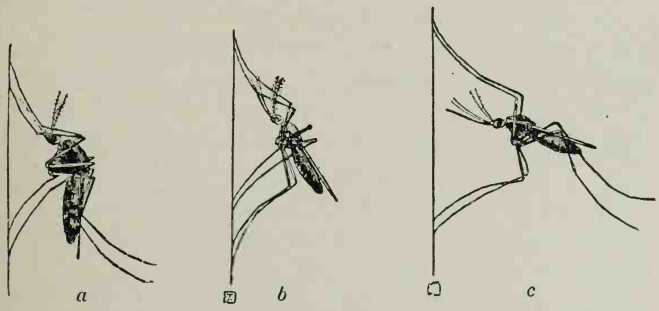


Fig. 1.—Various mosquitoes in attitudes of repose: *a*, Culex pipiens or common mosquito; *b*, Myzorrhynchus pseudopictus; *c*, Anopheles maculipennis or malarial mosquito (Manson).

their turn, get the malarial parasite into their bodies by biting a person who has the malarial parasites in his blood. Therefore the prevention of malaria may be summed up, first, in destroying mosquitoes; second, in

avoiding mosquito bites; third, in taking quinin to kill the parasites in the body. In the avoidance of mosquito bites the individual is protected against malaria and the community also, because only in this way do the mosquitoes become dangerous. Thus, malaria was practically unknown about Boston some years ago, but the advent of Italians, who were employed in large numbers in the Metropolitan Sewage System, introduced malaria to the region by infecting mosquitoes which had previously been harmless. The disease thus became indigenous in the neighborhood.

The female mosquito lays about 100 eggs on the surface of fresh water, and preferably in the presence of grass and scum of algæ. After eight days the insect becomes full-grown, does not fly great distances, and avoids wind, but seeks protection in grass, undergrowth, and brush.

The greatest danger threatens from mosquitoes bred within 300 feet of a house, although they may fly much greater distances. Within this area, at any rate, all agencies favoring the breeding of mosquitoes should be abolished. Tall weeds, shrubs, grass, and undergrowth of all kinds should be gotten rid of, and trees near the house are also inadvisable in a malarial region. Collections of stagnant water are particularly dangerous. Thus, disused wells, springs, empty cans, bottles, watering troughs for animals, roof-gutters, rain-water barrels, or depressions in the soil, or even in the hollow of leaves, where water may stand a week, are prolific breeding places.

The water should be changed in these places daily, or the receptacles should be screened, or kerosene may be kept on the surface of standing water, or the collections of water should be gotten rid of. One ounce of kerosene will cover 15 square feet of water. A constant drip from a partly opened stop-cock of a can is the best method of

application. Brooks should be kept clear of weeds, so that there may be no standing water, and ponds should be covered with petroleum, drained away, or stocked with various kinds of minnows. The filling in or drainage of marshes are essential.

Mosquito bites may be avoided by staying in a screened house except during the hours between sunrise and sunset. In case this is not practicable the head should be protected by a head net, the hands and wrists by gauntlets, and the ankles by leggings, especially in the tropics.

The house should be absolutely screened with wire netting of No. 16 mesh. In the tropics the bed should also be protected by a special netting, as described under Yellow Fever. In sitting after dark, women should cover their ankles with high shoes and their necks with scarfs. A bedroom well off the ground is safer from mosquitoes.

Where there are many mosquitoes in a room they may be killed by burning broken pieces of roll sulphur in a deep pan placed on bricks on sand, or inside a larger pan, to avoid setting fire to the premises.

Cracks about doors and windows should be made tight by pasting strips of paper over them.

In a reasonably well-built house this is unnecessary. Three pounds of sulphur are suitable for a room 10 by 10 by 10 feet. Eight ounces of wood alcohol are poured on the sulphur and ignited, and the door of the room is closed at once and not opened for twelve hours.

A word may be said about screening houses. Where the inmates sit outside after sunset the veranda must be wholly screened. Mosquitoes are only active during the night, and will enter a house through the smallest crevices, such as keyholes and chimneys. These must be stopped by wads of paper placed in the throats of chimneys, in fireplaces, and in keyholes. If the smallest holes are not

stopped a house will act as a trap for mosquitoes, who may enter but not find their way out. Wire screens should cover every door and window in the house which may be opened.

Window screens should not be movable, but the frames should fit tightly against the lower part of the upper sash and be fastened by screws. The upper sash must not be opened. The netting should not be larger than a No. 18 for the yellow-fever mosquito nor larger than a No. 16 for the malarial mosquito. The number means the number of meshes to the inch. A coat of thin paint will convert No. 14 into No. 16 mesh.

The taking of quinin to kill parasites in the body is the most practical measure of all, although not so useful as thorough screening, together with the taking of quinin. Thus, in Italy, where quinin is supplied free of cost to the poorer part of the population, the inroads of malaria have been tremendously reduced by daily consumption of quinin. Celli reports that the mortality from malaria has there been lowered 75 per cent., and in the malarial region about Rome the number of annual cases has been reduced from 11,653 to 2974 by this means.

In our farming population, where elaborate methods of screening and draining are not practicable, the daily use of quinin is the most satisfactory method of preventing malaria. Quinin does not, however, always kill all the malarial parasites in the blood, because in some persons the parasites may still exist, but the quinin keeps down their numbers sufficiently to prevent an attack, and the individual may feel perfectly well, the disease remaining latent in his system. No harm is done by taking the necessary preventive amount of quinin daily the year round, as was shown by the higher officials at Panama, who took 2 grains three times daily at each meal. In some persons

this dose may cause buzzing in the ears and discomfort, but this usually wears off within a week.

Quinin might only be taken during the mosquito season, but in case of persons who have had malaria the parasites may remain in sufficient numbers in the blood to produce an attack of fever before they are again bitten by mosquitoes the following summer. Such persons should begin to take quinin in March, and other persons should start to take it in June and continue it daily to November in this country. In the tropics it is necessary to take quinin the year round. The dose for adults should be 2 grains of quinin sulphate in capsules with each meal three times daily. For children under ten, 5 grains of the tannate of quinin in chocolate tablets are given thrice daily. This form of quinin does not contain half as much of the drug as the sulphate, and hence the larger dose. In children under five, 2-grain tablets three times daily will suffice. While capsules of quinin are the most soluble containers and preferable, yet, where the cost is important, quinin sulphate may be bought much more cheaply by the hundred in tablets. If these are properly made, they should begin to crumble in a glass of water within ten minutes. In this case they are suitable for use. The only objection to pills or tablets of quinin is that they are frequently so insoluble that they pass through and out of the intestines just as they were swallowed. In tropical countries, where malaria is severe, it is advisable to take more than 6 grains daily if it can be done without much discomfort. Thus, 3 grains should be taken three times daily, or even 10 grains daily is safer.

A patient suffering from malarial fever should be especially well protected by mosquito screening to prevent infection of mosquitoes which might bite him and thus transmit the disease to others. For this reason white

persons avoid the neighborhood of the native quarters in the tropics, as the mosquitoes are more apt to be infected there.

Of course, the precautions against malaria are only required in regions in which the disease exists; that is, in which the mosquitoes are infected with it. The disease is prevalent in many parts of the South and in the central Atlantic states, especially in the fall. In the northwestern states and on the northern Pacific coast it is unknown.

Malaria occurs in some places throughout New England, but is much less common about New York City and Philadelphia than formerly. The disease is only found in the Great Lake region about Lake Erie and St. Clair.

YELLOW FEVER

The prevention of yellow fever is the most interesting of any similar attempt in the history of medicine, on account of the heroism involved, the ingenuity practised, and the wonderful success attained. Yellow fever has been shown not to be contagious through contact with a patient, his surroundings, or discharges, but to be only transmitted through the medium of a certain species of mosquito, the Stegomyia fasciata. The great discovery was made in Cuba by United States Army surgeons in 1900 following the American occupation. As early as 1881 Dr. Carlos Finlay of Havana had suggested that yellow fever was due to mosquito bites, and the work of Dr. Ross in India had proved that malaria was only caused by the bites of mosquitoes, and these facts and theories stimulated the American Commission to experiment in regard to yellow fever. This body was made up of the following United States Army surgeons—Drs. Walter Reed, Carroll, Lazear, and Agramonte. The experiments were done at Camp Lazear in Cuba, in a frame house with a screened

vestibule, and so constructed as to shut out sunlight and fresh air. Previous to this time, in September, Dr. Lazear had permitted himself to be bitten by a mosquito in a yellow-fever ward and he sickened in five days and died a week later of the disease. Two months later fifteen mosquitoes which had bitten yellow fever patients were allowed to bite one of the volunteers at camp Lazear, and he became ill with the disease five days later, while two other susceptible persons slept in the same room for eighteen nights separated only by a mosquito screened partition from the patient. These latter remained perfectly well. Many other volunteers knowingly permitted themselves to be bitten by mosquitoes (which had bitten yellow fever patients a sufficient time previously) and they all took the disease. To prove that there was no danger of contagion from the clothes or discharges of yellow fever patients, two soldiers and a surgeon slept for twenty-one consecutive nights in a mosquito-screened house in which were boxes containing clothing of yellow fever patients soiled with their blood, urine, and bowel discharges. Each night the men handled these by unpacking them and hanging them on a line in the room, and each morning they packed them up again in the box. Moreover, two other soldiers slept twenty-one days in the night-clothes and sheets just as they had been taken from patients recently dying from yellow fever, and one of these men actually slept on a towel soiled with the blood of a yellow-fever patient. None of these volunteers took the disease. The outcome of all these experiments proved: (1) That yellow fever was only transmitted by the bites of a certain species of mosquito. (2) That the mosquito is harmless for a period of twelve days or longer after biting a yellow fever patient, but that then the mosquito is dangerous to man as long as it lives, in one case fifty-seven days following the biting of a patient.

(3) That a period of three to five days after a person is bitten by a mosquito, which has previously bitten a yellow fever patient, must elapse before the patient begins to sicken. (4) That the injection into a susceptible person of even 8 drops of blood taken from a yellow fever patient in the first or second days of his sickness will produce the disease in one who has not previously had it. (5) That the mosquito to be dangerous must bite a patient during the first three days of his sickness. (6) That there is no danger from contact with a patient, his clothing or discharges, but only from mosquitoes which have bitten patients.

Owing to this knowledge that hotbed of infection, Havana, which had been a pest-hole of yellow fever for 130 years was cleared of the disease by Col. Gorgas in 1901 by interfering with the breeding of mosquitoes, by destroying mosquitoes which had bitten yellow fever patients, and by preventing mosquitoes from biting patients. So, again, in Panama Col. Gorgas stamped out the disease absolutely within sixteen months of the American occupation in 1904, with no return since, and upon this result has the success of the canal construction largely depended.

Yellow fever is indigenous in Vera Cruz, Rio, and Spanish-American ports; it appears periodically in tropical Atlantic ports of America and Africa, and occasionally between the 15th and 35th parallels of north latitude. Where it is prevalent the taking of the temperature on the slightest feeling of illness will arouse the first suspicion of the disease if there is fever. The disease begins in a person who has been bitten three to five days before by a particular kind of mosquito, which has itself bitten a yellow fever patient some twelve or more days previously.

Yellow fever starts, like many another fever, with headache, pain in the back and limbs, nausea, and vomiting.

The peculiar features of the disease begin on the second day, with tenderness over the stomach, and the whites of the eyeballs begin to grow yellow with jaundice, while the gums are spongy and blood may be squeezed from them.

To personally avoid the disease, one should only go outdoors in well-lighted places (the Stegomyia may frequent darkened woods) between the hours of 9 A. M. and 3 P. M., as the mosquitoes are not active during this period. After 3 P. M. one should either seek elevations, where there are no mosquitoes, or remain in a thoroughly mosquito-screened veranda or room and sleep in a room high above the ground under a mosquito bar.

Mosquitoes already in a room should be killed by fumigation with sulphur, as advised under Malaria. If it is essential to be outdoors in the evening one should wear head nets, gauntlets, and leggings.

Screening of the house is even more important than in the case of malaria, where the method is described. A mosquito bar for beds should be made of fine bobinet, hung from an oblong frame above the bed.

The frame is better a little higher than the bed, and may be made by tying upright posts to the bed-posts and running a cord about the top of these on which the net is hung. It should not be slit on the side, but be made of one piece, which should hang from the inside of the frame, so as not to be interfered with by the posts, and be tucked in at the head, foot, and sides of the bed at night and also by day.

The beds should be three-quarters size, because if one's body projects against the mosquito net in narrow beds a mosquito may bite through the net.

DENGUE, BREAKBONE FEVER, DANDY FEVER

Dengue is transmitted from one individual to another by a special mosquito (Culex fatigans), and this is the only

known method of communication, as it is not contagious in the ordinary sense. The special germ which is the cause of the disease has not yet been certainly identified. The disease occurs in tropical and subtropical countries, as in India, China, and the Philippines, and in our Southern States, as far north as Virginia. Except in the tropics, it always appears during the warm season. Dengue attacks a large part of the population, and when the writer was a youth he acted as understudy for the medical profession in St. Augustine in carrying about medicine and advice for the doctors who were bedridden, together with everybody else, during an outbreak.

Three to five days after exposure the patient comes down with high fever, chilliness, and excruciating pains in the head, back, legs, and joints, especially the knees. These symptoms continue for three or four days, and then the fever departs for two to four days, only to reappear again for a few days longer, although the disease does not usually last much more than a week. Various eruptions are usually present, and there may or may not be swelling in the painful joints.

The writer attributed his escape from dengue to previous dosage with 10 grains of quinin daily, but this means of prevention is denied by some of the leading medical authorities. The only known opportunity of escape is by avoiding all mosquito bites by means suggested under Malaria and Yellow Fever. Fortunately, while dengue is exceedingly painful it is not a fatal disease.

CHAPTER VI

GERM DISEASES (Continued)

Tuberculosis, Colds, Influenza, Cerebrospinal Meningitis, Infantile Paralysis

TUBERCULOSIS

Tuberculosis is the chief destroyer of the human race. Yet the deaths from it are steadily declining; so much so, that while it has been estimated that one-fourth of all deaths in Europe in the last century were due to the disease, at the present time it produces but one-tenth of all deaths in the most enlightened communities.

This result has been accomplished by methods of prevention, depending upon our increasing knowledge of the disease and the various means by which persons become infected. Our exact knowledge of the contagiousness of tuberculosis dates from the discovery of Koch (in 1882) that it is caused by a special germ; in fact, this epoch marks the beginning of our knowledge of germ diseases, since the germ of consumption was the first to be thoroughly studied and proved to be the one and sole cause of tuberculosis.

There are some astonishing facts which we must first consider before we can have a rational conception of the disease. While the name "tuberculosis" strikes terror in those afflicted with it, yet the really important matter is not so much whether one has tuberculosis as whether one has it in a serious or active form. Or, in other words, whether the disease is in an active state, or whether

it is inactive or healed. Now for the facts: Over 90 per cent. of city dwellers show signs of tuberculosis in their bodies after death from any cause; 60 per cent. show signs in the lungs. The tuberculin test, which is used in living patients, is so delicate that it will not only show active and serious tuberculosis, but the presence of minute and even practically healed small, diseased areas in any part of the body. By this test 90 per cent. of all children are proved to be tuberculous by the age of twelve, and 60 per cent. of healthy young adults. If the whole population of city and country are considered, it is estimated that from 50 to 70 per cent. are tuberculous in some degree. It will thus be seen that while 1 in every 10 persons dies of tuberculosis, 8 in every 10 become infected with the disease and recover—in most cases the disease being so slight that the patient is never aware of any disturbance caused by it.

To prevent tuberculosis one must know how it is acquired. The disease is not directly inherited from either parent; that is, the germ does not pass from either parent into the embryo (child) at the time of conception. If either parent is tuberculous the disease may be communicated to the child soon after birth. A certain susceptibility may be inherited (recent research rather points to the existence of some immunity against the disease in the offspring of the tuberculous) and a peculiar build may predispose to consumption. In some families various members succumb to the disease at a certain age, as from eighteen to twenty-five. Among the children of 1000 families tuberculosis was found to be 10 per cent. more common in the offspring of tuberculous parents. This does not necessarily show heredity or susceptibility, but is what would be expected in the case of children exposed to a contagious disease.

It is now generally accepted that childhood is the age at which tuberculosis is more frequently acquired, although it may lie dormant until adult life and then become active as consumption. The supposedly inherited build suggesting greater susceptibility to tuberculosis is that represented by pale, thin, blond, delicate-skinned persons with sloping shoulders, projecting shoulder-blades, and long, narrow, and flat or rounded chests. It is probable that these persons are already sufficiently infected with tuberculosis to cause their inferiority in physique.

Consumption in children—that is, tuberculosis of the lungs—is comparatively rare. Tuberculosis in them begins in enlarged glands of the neck, the bones and joints, and brain. Ninety-four per cent. of children have enlarged glands in the neck and 80 per cent. of these are tuberculous. The germs enter the system by three paths, either through the mouth and throat, from the intestines, or in the air taken into the lungs. The latter pathway was formerly thought the most frequent one, but it has been shown that tuberculosis germs swallowed by calves or injected into their tails enter the blood and may only lodge in their lungs and not cause disease at the site of entrance into the body.

What is the most common path by which the germs enter the human body? This is still a debated point.

The germs arise from patients with consumption who have the disease in an active form; that is, the lungs are ulcerating, and the broken-down tissue, containing millions of germs, is coughed up.

The germs soil the fingers, pillow, handkerchief, and various objects, food and utensils handled by the patient, and enter into the dust of the room. Children crawling around, placing all kinds of objects in their mouths and sucking the fingers, toys, and other contaminated objects,

are thus apt to get the germs into their mouths, which are absorbed into the blood from the mouth or digestive tract. Then there is great danger from consumptives with germs in their sputum (expectoration), when one is in close proximity to them during coughing, from the minute droplets sprayed into the air. Children run great danger from the milk of tuberculous cows. This disease is extremely frequent in cattle—in some herds as many as 90 per cent. are affected; among 24,000 cows in Massachusetts 50 per cent. were tuberculous, and throughout the whole country 10 per cent. of the milk cows are tuberculous. Taking at random samples of mixed milk on the market it has been shown that one in every ten will contain the germs of tuberculosis and will communicate the disease to animals. Even the milk from certified herds, which are tested for tuberculosis, is not absolutely safe, as animals develop the disease between testing times, and the writer has known of one instance where 20 per cent. of the animals in a certified herd were tuberculous through carelessness of the management. The most glaring example of the danger sometimes inherent in the (apparently) best and cleanest milk which money can buy is that recently (1915) brought to light in the case of one of the leading certified milk farms in the United States. In a herd of over 600 cows considerably more than one-third of this number were suddenly found to be tuberculous by the health authorities through an accidental occurrence. Certified milk is the best raw milk procurable as a general proposition, but it is far from infallible in even the protection against tuberculosis, which is the danger most readily avoidable. Proper pasteurization will make milk perfectly safe. It is estimated by leading authorities that 15 per cent. of the deaths from tuberculosis in children (under five) are due to cows' milk, and that from 20 to 25 per cent. of all cases of tuberculosis

in children arise from drinking cows' milk. Milk causes 8 per cent. of the total deaths from tuberculosis and kills over 10,000 children annually in this country. Consumption or pulmonary tuberculosis is not caused by the bovine germ, but is always derived from a human source, unless the bovine germs become altered by growth in the human so as to simulate the human tuberculosis organism.

In children especially, diseased tonsils lead to enlargement of the glands in the neck, and these are frequently tuberculous, as we have seen.

Diseased tonsils often act as paths of entrance for tuberculosis germs, and in 100 tonsils removed at Ann Arbor one-fourth were found to contain such. The average of all examinations by many doctors shows that only 15 per cent. of removed tonsils are tuberculous (Ravenel). Adenoid growths in children (see page 155) and enlarged tonsils both interfere with breathing, and thus favor consumption by reducing general vitality and by interfering with the proper ventilation of the lungs.

To summarize, it may be said that in children the greatest danger of tuberculosis is from food, especially raw milk and food and other objects placed in the mouth, infected by handling, by coughing, and by dust; while in adults there is more danger from exposure to coughing and dust. That the germs pass more often through the mucous membrane of the mouth and intestines into the blood, and less often lodge in the lungs directly from the air. That consumption in adult life often follows tuberculosis of the glands in children.

That infants and children are most susceptible, and possibly the children of tuberculous parents possess less resistance to the disease, but this appears to be doubtful. That adults are comparatively insusceptible to tuberculosis either because they actually have it in a latent

form, or have recovered from it, and they do not retake the disease (*i. e.*, the reopening or "lighting up" of former tuberculosis or the entrance of a fresh supply of tuberculous germs into the body) unless through long exposure, or circumstances which greatly lower their general vitality or local resistance, as by the presence of colds, bronchitis, and influenza. Consumption is never communicated to attendants in well-regulated hospitals, and in the case of 64 throat specialists constantly exposed to the breath and coughing of consumptive patients for years not one developed the disease.

On the other hand, when proper precautions are not adopted the danger of communication to adults living or working in the same rooms with consumptives is considerable. This is so well recognized that in life insurance applications one is asked if he has lived or worked with a consumptive.

Thus, Lampson, of Minneapolis (in 1913), examined 173 persons living in 33 families, in each of which there was a known case of open consumption; that is, one in which the tuberculous germs were expectorated. He found that 100 of these 173 individuals (exclusive of the known cases) also showed evidences of tuberculosis, and in all the (54) members of 10 families signs of the disease existed. Whereas, in 15 families, in which no case of tuberculosis was known to exist, there were 80 persons, and only 2 of these gave evidences of tuberculosis.

Nevertheless, the consensus of medical opinion is that 9 in every 10 adults are immune to tuberculosis. This is based on the fact that having once had tuberculosis one rarely wholly recovers. Small areas in the body contain living germs of tuberculosis, and although they are enclosed by inflammatory tissue, yet the germs are often found circulating in the blood of apparently healthy

persons. Therefore, as 9 out of 10 adults have tuberculosis, they cannot take it again. An active tuberculosis in adult life means a breaking down of old latent trouble. An extra dose of germs derived from exposure to a consumptive will rarely harm the adult already suffering from a latent form of the disease. The belief is then prevalent among the leading authorities that 9 in every 10 adults may be exposed to active consumption with impunity. But a child, or the tenth adult who has not been protected by a previous mild tuberculous infection from milk or from human beings, will probably have the most fatal form on exposure to the disease—as the aborigines succumb to it and other contagions. Consumption is one of the less severe forms of tuberculosis dependent upon a partial immunity existing in the subject. This is not a plea for unnecessary exposure to tuberculosis, because an individual does not usually know whether he is susceptible or not, and children must be protected at all costs.

Certain occupations favor the incidence of tuberculosis. Some of these produce irritation of the membrane lining the air-passages, as the dusty trades—stone-cutting, metal grinding, working in wood and certain textiles, mining. Glass-blowers, cigarmakers, hat and cap makers, printers, and bookkeepers have been found especially susceptible to the disease. While glass-blowing may mechanically irritate the lungs, yet in many of these occupations the chief harm is done by ill-ventilated quarters, lack of sufficient space, overheating, overwork, and underpay. Industrial workers constitute about one-third of the population, and furnish about half the deaths from tuberculosis in this country, and by removal of the dust, through properly controlled sanitation of factories, the number of cases and deaths from tuberculosis may be reduced by one-half, as has

been accomplished in the cutlery industry in Germany (Kober).

It is thought that persons who develop sudden and acute tuberculosis late in life are those who have escaped the disease in childhood, for with a mild form of tuberculosis, such as most of us have, one acquires a certain degree of immunity, as in the case of individuals recovered from measles or scarlet fever. In calves the injection of small doses of living, non-virulent (human) tuberculosis germs produces an immunity which persists for an uncertain period. The germs of tuberculosis may live for years in an apparently healthy person and may even be found in their blood. In healed areas in a lung or gland the germs become so surrounded by scar tissue that they cause no sign or symptom because they are shut off from the circulation. But let a person become "run-down" and his resistance lowered, and partial immunity caused by a mild infection with tuberculosis in childhood no longer protects him; the tissues about the germs break down and the germs escape into the blood to cause active, serious disease in some part of the body. In most cases we are wholly ignorant of the presence of tuberculosis germs until many years after their entrance into our bodies. Every cause tending to lower the general health—as disease, overwork, undernourishment, dissipation, bad habits, overcrowding, and poverty—favor tuberculosis, which causes one-third of all deaths between the ages of twenty and forty, the time of greatest stress and strain from work or dissipation.

A large portion of consumptives do not cough up matter containing the germs because the diseased area is not connected with the air-tubes and is surrounded by a wall of inflammatory tissues. If there is no expectoration, or if frequent examination of the expectoration shows that

it is free from germs, the patient cannot transmit the disease to others unless his condition changes.

What are the early signs of tuberculosis in adults? Loss of weight, loss of energy and ambition, and a tired feeling; digestive disturbances; frequent and prolonged colds; pleurisy or spitting of blood; pain about the shoulder-blades or between the shoulders; hacking or tickling cough in the throat, hoarseness; fever and night-sweats. The existence of one or more of these symptoms should cause the subject to seek medical advice.

A proper medical examination will include taking temperature at two-hour intervals for several days, examination of the expectoration, if any, tuberculin test and *x*-ray examination, besides the ordinary tapping on the chest and listening to the breath sounds with the stethoscope. It is often impossible to make a positive diagnosis because the symptoms and signs are indefinite. The *x*-ray and tuberculin test may indicate tuberculosis, and yet the disease may not be in an active state.

But in all doubtful cases the treatment is never doubtful. The same upbuilding which is most suitable in tuberculosis will be indicated in debility from other causes.

Now in regard to the preventive measures to be adopted in the case of children of tuberculous parents. The danger to infants nursing tuberculous mothers is slight from the milk, but there is more danger to the child from soiling of the breast and other objects by the mother's fingers, and she would very probably be too much debilitated to undertake nursing. (In cows the milk is chiefly infected from the germs in manure, which commonly contaminate their milk.) So that nursing a tuberculous mother is undesirable, and the child should be brought up as much apart from tuberculous parents as possible and should stay outdoors the greater part of the time. A separate room is

advisable for a nursery, with no unnecessary furniture, curtains, or carpet to catch the dust, and every effort should be made to keep children from placing toys, pencils, and various objects in their mouths.

Great care should be taken to wash their faces and hands three times daily before eating and to brush their teeth at least twice daily after meals. Separate eating and drinking utensils, handkerchiefs, table, bed and body linen must be provided for children, and all objects coming in contact with consumptive parents or other persons should be avoided. The effect of crowding is seen in the observation of Knopf, that 42 per cent. of all cases of tuberculosis occurred in families living in one room, while but 6 per cent. of all cases were seen in families living in four or more rooms (Berlin). Parents whose expectoration is filled with tuberculosis germs had better themselves be removed to a hospital to prevent infection of children. This applies more especially to the poor. Advanced cases of consumption, when bedridden and unable to care for themselves, are the chief source of danger in spreading germs and tuberculosis. What is worth doing for animals is certainly worth doing for children. It is generally recognized that the only way to keep calves free from tuberculosis, when born of tuberculous cows, is to raise them in separate barns, yards, and pastures, and to feed and water them from separate utensils. In youth overstudy and over-athletic training are equally harmful, while late hours and the use of alcohol, tobacco, and excesses of all kinds should be especially avoided in young adult life by those who have been exposed to consumptives. In case any of the symptoms noted above develop in such individuals medical advice should be sought, as these are often premonitory of active tuberculosis and a change of life at this time is usually sufficient to avert the disease.

Marriage should not be considered in the case of a person who has active lung tuberculosis with germs in the expectoration. Whether marriage is proper in the case of individuals with healed, inactive, or closed lesions in the lungs depends upon all the circumstances involved, and an expert should decide. A person may have active tuberculosis, apparently recover, and yet be a carrier of tuberculosis germs in his expectoration, as in the classical instance of the recovered consumptive who caused the death of four wives by tuberculosis while remaining in apparent health himself.

A patient with active tuberculosis who is able to be about and care for himself may not be a source of any danger to others by conscientiously adopting the following precautions: His expectoration should always be deposited in a pasteboard box, made for the purpose, which is daily burned with its contents. The use of handkerchiefs or cloths leads to soiling of the hands, pockets, bed clothes, etc. When coughing in the presence of others a paper handkerchief should be held before the face to prevent spraying of the germs into the air of the room. Any object placed in the mouth should be burned, as toothpicks, cigar butts, etc.

The tooth-brush should be used three times daily, over the toilet and not over a wash basin. The face should be kept shaven and the face and hands washed frequently. It has been found that the ordinary washing of eating utensils is sufficient to prevent contagion from them, but the napkin should be kept in a separate envelope unless used but once.

The bed and body clothing should be boiled for ten minutes before being sent to the laundry. The patient's room should be cleaned without stirring up dust, using a moist cloth or wet broom, or, better, vacuum cleaning.

The bed should be covered with a counterpane which is frequently washed, and the upper sheet should be turned down well over the blankets to protect them from the patient's coughing and sneezing.

With such precautions patients make safe companions, as shown by the fact that there is no danger from patients to attendants in well-regulated sanatoriums.

New York, under the supervision of Dr. Herman Biggs, is the model city of the world in the public control of tuberculosis. The death-rate from tuberculosis has been reduced 50 per cent. in the last twenty-five years, or from 3.98 to 1.97 per thousand. This is accomplished by compulsory notification of cases, printed instructions sent to patients, special hospitals, free dispensaries, and visiting nurses for charity cases; free examination of expectoration and early diagnosis, free dispensing of sputum cups, medicines and food, and disinfection of all premises occupied by consumptives. By far the most important of all measures to prevent the spread of tuberculosis is the segregation of advanced cases in hospitals, and this has been the chief means all over the world of lessening the number of patients and, therefore, the mortality.

As we have seen, chronically enlarged glands in the neck in children are very common and usually are tuberculous, and in course of time the germs find their way into the blood and may in the end lead to disease of the lungs. Therefore it is extremely important to cure enlarged glands. Removal of diseased tonsils and adenoids in children, *x*-ray treatment of the glands, combined with a diet of milk and eggs, and living and sleeping outdoors, will usually cure the glandular swellings in the neck. In adults removal by the knife is commonly advisable.

To prevent tuberculosis in children cows' milk should be pasteurized. The cleanest milk is best, certified if

possible. Home pasteurization is safest unless one is sure of the dealer. Fill the outer part of a 2-quart double boiler as high as possible with water and bring it to the boiling-point. Then take off the fire and place a quart of milk in the inner part of the boiler and insert this in outer part. Put on the cover and let the double boiler stand with a cloth over it in a warm place for forty-five minutes. Then cool the milk and keep the milk covered on ice. The milk should be kept at 145° F. for thirty minutes, and to secure this it is well to test it with a thermometer during the heating process.

Cleaning and disinfecting rooms occupied by consumptives are of great importance. Mattresses and carpets which cannot be sterilized by a municipal steam plant should be burned.

Disinfection by formalin is most effective, followed by general cleaning and renovation. For this the furniture should be moved from the walls, rugs lifted from the floor, and clothing exposed.

Then 2 cups ($\frac{1}{2}$ pint) of formalin are mixed with a cup of water in a water pitcher, and to this is slowly added 3 fluidounces of commercial sulphuric acid.

One pound of quicklime is placed in a large enamel basin on some bricks in the center of the room and the solution in the pitcher is poured over the lime and the door quickly closed and sealed by strips of paper pasted over the cracks. This quantity of chemicals is sufficient for an ordinary small bedroom (10 x 10 x 10 feet—1000 cu. ft.) which is reasonably tight. After the room has been closed for twelve hours it should be aired and everything possible washed with soap and water containing a generous tablespoonful of compound cresol solution to the quart. Then the walls and ceiling may be calcimined or prepared so as to secure the most complete renovation. All fabrics and bed or body

clothing should be boiled for twenty minutes, or soaked in 1 : 1000 corrosive sublimate solution over night.

The prevention of overcrowding in factories and workshops, and medical examination at regular intervals of employees in stores and in buildings in which large numbers of persons are working, are of great value in limiting the ravages of tuberculosis.

The chief measures of prevention are three: 1. Segregation of advanced cases to avert distribution of enormous numbers of germs. 2. Early diagnosis. 3. Improvement of individual health.

COLD IN THE HEAD

Colds are due, in the first instance, to changes in the circulation, and, secondly, to the presence of certain germs in the nose and throat.

Thus, in the classic experiments of Rossbach, who opened the windpipes of rabbits and placed ice on their bellies, it was found that the cold on the outside of the body produced intense congestion in the air-passages. It is well known that exposure to cold or wet (the same thing) is likely to cause a "cold," especially if one is overheated at the time. Other conditions leading to abnormal congestion of the mucous membranes likewise favor colds, as chronic catarrh from any cause—commonly nasal obstructions, diseased tonsils, and adenoid growths, particularly in children. Irritation of the mucous membranes of the nose and throat is also occasioned by hot, dry air, as from the effect of hot-air furnaces and by dust, and, apparently, by some forms of indigestion and debility. If the resistance of the mucous membranes to germs is not lowered by the foregoing means then the presence of germs which are ordinarily found in the air-passages may do no harm. Or, again, the transmission of actively infectious germs from a

patient may lead to an attack of cold in healthy persons. A variety of germs are commonly found in the nasal discharges of those with colds, one or the other preponderating, according to season and place. These may be germs causing true influenza, or those producing pneumonia (when they may attack the lung, which they ordinarily do not in colds), or those responsible for inflammation of wounds (pus germs), or a special germ (Micrococcus catarrhalis), which is the sole source of some colds.

Thus, two factors are essential for the production of colds—congestion of the mucous membranes and the presence of certain germs—and apparently both are necessary. In places free from germs, as on mountain tops and in arctic regions, exposure to cold and wet does not ordinarily induce colds on account of the absence of germs; while, on the other hand, our nasal passages may contain the same germs found in the discharges of those with severe colds, and yet we may remain absolutely well if we keep our mucous membranes in good condition.

To avoid colds we must, then, avoid chronic catarrh, dry overheated air, city dust, indigestion, dissipation, or any causes lowering the general tone or the local tone of the mucous membranes. In children removal of enlarged tonsils and adenoids are often required, and removal of nasal obstructions in adults. Vaccines made of all the varieties of (killed) germs which are found in the nasal discharges of persons with colds are now used to induce immunity in those subject to repeated attacks and also in treatment of an existing cold. Their use is harmless, but how much value may be attributed to them it is yet too early to affirm. It is difficult to understand why vaccines should afford immunity to colds when the having of a cold affords no protection to the patient against taking another. They are beginning to be used extensively, however.

What shall be done on the first premonition of a cold—when one feels a stuffiness in the nose, sneezes frequently, has a roughness or dryness and discomfort in the upper part of the throat, and chilliness.

Both general and local measures are advisable. General treatment consists in increasing the normal secretions of the skin, bowels, and kidneys. Thus, one should take a laxative—one-half to one bottle of effervescing citrate of magnesia—should drink a quart or so of hot lemonade, and take a hot bath before retiring, or a Turkish bath may be taken if one can drive directly home without exposure and go to bed at once. Capsules, each containing 1 grain of quinin, $\frac{1}{2}$ grain of camphor, and $\frac{1}{10}$ grain of extract of belladonna, are useful in the very beginning of a cold.

One should be taken each hour until four or five have been swallowed, unless there is much dryness of the mouth, when it is well to stop them.

If the nose is much obstructed it is well to take a few of these tablets at any time to lessen the swelling in the nose, by causing contraction of the blood-vessels of the mucous membrane. Taking a 2-grain capsule of quinin hourly, until three, four, or five doses are swallowed, or until there is ringing in the ears, appears to have some influence in preventing colds, but is less effective than the above combination.

Among the local remedies the dropping of half a medicine-dropperful of a freshly made 20 per cent. watery solution of argyrol in each nostril the writer has found most useful in aborting a cold if used a few times at three-hour intervals at the first suggestion of the trouble. The head should be thrown well back, and a medicine-dropper is filled half-full of the solution, which is allowed to flow slowly into the nose and so on into the throat.

The solution is harmless if swallowed. It is well not to

blow the nose afterward more than possible, and to use pieces of cheese-cloth or old bits of cotton, which may be thrown away as soon as used, for the solution will stain the handkerchief badly. These stains may be immediately removed, however, by a 1 : 1000 solution of corrosive sublimate made with the ordinary surgical tablet. Argyrol is a most useful agent in preventing the growth of germs when locally applied, and will prevent the occurrence of the most dangerous inflammations of the eye and of the sexual organs (see page 191). When there is much obstruction in the nose and breathing through it becomes difficult one may sniff up occasionally into the nostrils a little Pond's extract or witchhazel from the hand, which will be found very effective. But this is not a dissertation on the treatment of cold, and we must stick to our subject of prevention. The argyrol solution may be dropped into the nostrils of infants or children while they are lying in bed without causing distress or subjecting the patient to the slightest danger from swallowing the medicine. As the solution does not keep well for longer than a week, one may use in its place a solution of $7\frac{1}{2}$ grains each of menthol and camphor in an ounce of liquid albolene (similar to liquid vaselin), dropped into each nostril in the same manner, and this solution is useful throughout a cold when dropped in the nose four times daily, and for children is preferable, in that it will not stain the clothing as does the argyrol. This is also absolutely harmless if swallowed.

The best treatment of all severe colds is that secured by remaining in bed. While the temperature is over $99\frac{1}{2}°$ F. one is always safer in bed with a cold. The even warmth of the coverings tends to bring the blood to the surface of the body and relieve the congestion in the air-passages. It is the direct opposite of Rossbach's cold applied to the outside of the abdomen in producing congestion in the

breathing apparatus. For persons subject to colds the daily sniffing of a solution made from Seiler's alkaline antiseptic tablets (one tablet to half a cup of warm water) into the nostrils, and the gargling of the throat with a half pint of cold water twice daily, are of great benefit in cleansing these parts of germs. Then, as is well known, the hardening of the skin by daily cold baths, showers, or cold sponging (in delicate persons while standing in warm water) will be of great service. Persons with bald heads may bathe their heads in cold water.

Cold baths should not be taken unless a warm reaction follows, and the use of a very warm bathroom greatly favors this result. Also light underclothing is of advantage in hardening the skin, and many persons catch cold by the opposite process through wearing too warm underclothing in cold weather. The material is not of so much importance; light wool is best, but many do as well with cotton or linen. So children should be brought up to scorn drafts, unless the skin is moist from perspiration. It does one good to get used to sitting in drafts and thus harden the skin to cold, with the above exception. Germ-laden dust is one of the most prolific sources of colds and pneumonia in cities. Clean pavements will prevent this danger. In Seattle the streets are paved with brick or asphalt, and are washed daily with a hose in the business sections, and this city has the lowest death-rate in the United States. Infants should not be taken out in cities when the air is filled with dust unless the face is well protected by a veil. The general precautions which are advised herein will apply as preventive measures against diseases of the air-passages and lungs as a whole, including bronchitis and pneumonia.

There is one favorite preventive against cold, recommended by the justly famous Dr. Alonzo Clark, which we

have omitted. It consisted in hanging one's hat on the bedpost and drinking whisky and water until one sees two hats. Times have changed, and neither present morals nor scientific teaching favor this, to some, agreeable treatment.

INFLUENZA, LA GRIPPE

It is difficult to define what influenza is. Many doctors call any severe cold with fever influenza. Since Pfeiffer's discovery (in 1893) of a special germ as the sole cause of influenza, one would naturally limit the cases of influenza to those in which the Pfeiffer germ is present. But the influenza germ is found in the nose and throat secretions in many persons who are suffering from other diseases, as bronchitis and consumption, or chronic cough, while, on the other hand, there are many other germs which produce exactly the same symptoms as those caused by the true influenza bacillus. Thus, severe influenza-like colds are due commonly to the same germs which produce blood-poisoning in wounds (pus germs), or to those which under other conditions will occasion pneumonia, or to a third kind of germ peculiar to severe colds. In the wide-spread epidemics of influenza which after an interval of often many years extend over the civilized world the sole cause appears to be the true Pfeiffer bacillus, or influenza germ. During the periods of freedom from these great outbreaks attacks precisely resembling influenza may be either due to the influenza germ or to the others already noted. It is well to regard all severe catarrhal colds with fever as influenza because they also are contagious and should be treated as influenza.

Influenza is a very contagious disease, and is communicated by contact of one person (carrying the influenza germ in his nose or throat secretions) with another susceptible individual. It was formerly thought that the disease was

communicated through the air, because influenza might suddenly appear in persons in a remote island or other place away from the general source of infection. But now that we know that persons carry about influenza germs in the secretions of their nose, throat, and bronchial tubes for years there is nothing to prevent such an one from communicating the disease in an active form to any susceptible individuals at any time.

Yet it is only when influenza is prevalent that one can in some measure use preventive means to avoid the disease. These consist in attending to the general health, refraining from fatigue and undue exposure, and keeping from crowded rooms or cars or buildings. It is thought by some that taking $2\frac{1}{2}$ grains of quinin in capsules three times daily at mealtimes or, in case this does not agree, $7\frac{1}{2}$ grains of urotropin in a whole glass of water thrice daily between meals, will protect an adult against the disease. To protect healthy persons in the same house with the sick it is necessary to isolate influenza patients in a room and burn all the secretions from the nose or throat which may be received on paper handkerchiefs, pieces of gauze, or cloth.

Then the patient's bed and body clothing should be boiled before being laundered, and the drinking and eating utensils should also be placed in boiling water after use. An attack does not protect one from another; in fact, unlike most contagious diseases, instead of the patient being made more or less immune, he appears to be made more susceptible to the disease.

The feeble, aged, and children should be protected from influenza, as far as possible, by isolation in their rooms or, better, outdoors away from the crowd. So many persons go about with influenza that it is not possible to avoid them in crowded places during epidemics. Among thousands of fishermen at sea none contracted influenza

except immediately after leaving port or after mixing with the crews of other vessels. The time of development, from exposure to the appearance of the first symptoms, is usually only two to three days. As Dr. Lord, of Boston, has found the true influenza germs in 25 to 59 per cent. of all persons with cough and expectoration (at other times than during influenza outbreaks), the frequency with which exposure is possible becomes alarming. The moral is to treat all coughs and colds as contagious, and destroy the secretions by burning or boiling the material on which they are collected, while the patient should absent himself as much as possible from society. Nothing is more exasperating than to have a friendly (?) visitor introduce a bad cold into a home and leave a long trail of sickness, suffering, and expense behind him.

CEREBROSPINAL MENINGITIS

This is a disease due to a special germ (meningococcus). It frequently occurs in epidemics and in the country rather than in cities. Children are more often attacked, although adults, particularly those living in squalor or crowded together as in military camps, are quite susceptible. It is not a very contagious disease, there being seldom more than one or two cases in a house. However, it is such a dreadful malady that all possible precautions should be observed. Meningitis usually comes on suddenly with headache, pains in the back and limbs, chills, and vomiting. So far it resembles "grippe," but its peculiar characteristics include stiffness and rigidity of the muscles of the neck and back, with a drawing backward of the head, and the whole body may be so stiff that a person can be lifted like a statue. There are also tremblings or spasms of the muscles of the arms and legs. Delirium and stupor occur, the eyes are sensitive to light and often squint, the pupils are large, and

a rash often appears on the body. The wonderful work of Simon Flexner in producing a serum by injecting into the blood-vessels of the horse, first, a solution of dissolved, dead germs of cerebrospinal meningitis and, later, the living virulent germs has revolutionized the treatment of the disease. After receiving increasing doses about four months the horse is bled and the clear fluid (serum), resulting from clotting of the blood, is injected into the space surrounding the spinal cord of human patients at the earliest possible moment.

In meningitis the normal fluid surrounding the spinal cord is increased greatly in amount and becomes cloudy from "matter" or pus.

This fluid should be withdrawn from the spinal canal in the beginning of suspected meningitis, in order to absolutely verify the diagnosis, by finding the special germs with the microscope; and, again, the removal of this fluid relieves the pressure on the spinal cord and brain and may occasion a corresponding improvement in the symptoms, as headache, delirium, stupor, etc. This result is accomplished by inserting a strong, hollow needle through the muscles over the spine in the lower part of the back, directly into the space surrounding the spinal cord. After the fluid flows out through the needle the curative serum is allowed to flow into the needle from a funnel connected with the needle by a rubber tube. The amount of spinal fluid removed and serum injected are controlled by the fall of blood-pressure caused by both these procedures. Serum is also injected under the skin, and the serum treatment is generally repeated daily for three or four doses.

Cerebrospinal meningitis is a very fatal disease, death occurring in 70 to 90 per cent. of cases without the serum treatment. To secure the best results the serum must be

given within the first three days of the disease, when the average death-rate is reduced to 34 per cent., and the duration of the disease shortened from many weeks to one or two. One authority (Sophian) has reported a mortality of only 15.5 per cent. in 161 cases of cerebrospinal meningitis by the most skilful use of serum.

Prevention.—The special germs (meningococci) are not found outside the human body, and they die within a few hours when dry or exposed to sunlight. The germs may be found in 90 per cent. of patients in the nose and throat. The disease is spread by patients and healthy persons exposed to patients who carry the germs about in the nose and throat without suffering any inconvenience, or, at most, only from cold in the head. It has been found that 55 per cent. of healthy persons exposed to the disease become carriers, or that there are ten carriers for every case of meningitis.

Carriers may communicate the germs to persons, who, in turn, may either become carriers or take the disease. Meningitis germs may live but a few days in the nose and throat of carriers, or they may mostly disappear and later reappear in large numbers, or, if the carrier becomes depressed in vitality, the meningitis germs may invade his blood and induce a real attack of the disease; or, finally, the meningitis germs may persist in the nose and throat of carriers for months or years. In the case of patients the germs are not only present in the secretions of the nose and throat, but in the urine, and in discharges from the eyes, ears, or skin eruptions.

Patients should always be isolated in a well-ventilated and lighted room, stripped of carpet and unnecessary furnishings. The other members of the household who have been exposed should also be quarantined in the house, away from the patient, for a week, or until cultures taken

from the nose and throat on two occasions show the absence of meningitis germs. The cultures are taken exactly as in the case of diphtheria. In order to get rid of the meningitis germs in the nose and throat one should spray these parts with a solution containing 5 grains of common salt to 2 tablespoonfuls of water, or with Seiler's or Dobell's tablets dissolved in water according to directions, three times daily, and after a few days the desired result will usually be accomplished. Children should not be permitted to use any but personal handkerchiefs, pencils, eating utensils, food, etc.

The discharges of patients should be burned and the urine disinfected, as advised under Typhoid Fever. All handkerchiefs, bed and body clothing, and eating utensils used by patients should be boiled after use. It is not necessary to disinfect rooms after occupation by the sick, as sunlight and ventilation are sufficient. During an epidemic the congregation of persons in public should not be allowed and schools may be closed. Care should be taken to avoid colds or to have them carefully treated, and close intimacy in talking, sneezing, coughing, and kissing are inadvisable. Children should not use articles which have been in the mouths of others, as cups, pencils, handkerchiefs, food, gum, etc. One should avoid close contact with persons having colds, and handkerchiefs which have been used by them should be boiled. Plenty of fresh air and sunshine soon kill the germ in the house. Nurses should wear gowns and caps in attending the sick, and cover their faces with gauze when exposed to the breath of patients. Taking 10 grains of urotropin in a glass of water three times daily will protect healthy persons against the disease to a certain extent by acting as an antiseptic on the various secretions and excretions of the body. There are two

special preventives which are more effective than all others. Vaccines, as in typhoid fever, composed of the dead bodies of meningitis germs in solution are injected under the skin at intervals of a week or ten days in three doses. The first dose is one-fifth (100,000,000 germs) that used for typhoid fever. This treatment is as yet in its infancy, but in 5000 persons thus protected in the 1913 Texas epidemic there were no cases of disease and the treatment is without danger. In severe epidemics the injection of the serum described above will protect the individual for two or three weeks when given in small doses (about one teaspoonful) under the skin. Vaccination requires some weeks to secure protection, but it is then of considerable duration—probably lasting several years. Serum protects at once, but temporarily, and is not so desirable if the patient has to be given serum later, on account of the possibility of producing the serum disease discussed under Diphtheria.

INFANTILE PARALYSIS (POLIOMYELITIS)

This disease resembles cerebrospinal meningitis in many respects. It occurs in epidemics, more often after very hot weather in the latter part of summer or autumn, and frequently is seen in isolated cases, as is meningitis. Then, again, the special germ of the disease is found in the brain and cord and in the secretions of the nose and throat, as in meningitis. Another resemblance lies in the fact that infantile paralysis is contracted through contact with the sick or with carriers, *i. e.*, healthy persons who acquire the germ through exposure to the sick or from other carriers, and who may remain carriers, or communicate the disease to others, or take the disease themselves. Even when the germs are injected

experimentally into the brain of a monkey they soon appear in the secretions of the nose and throat.

Another similarity of infantile paralysis to cerebrospinal meningitis consists in the circumstance that it is not particularly contagious, and in this respect the two diseases may be classed with pneumonia.

The germ of infantile paralysis is so small as to be invisible microscopically, except in mass. It grows in the nose, throat, and nervous system, and is expelled in the bowel discharges. It enters the brain cavity through openings in the skull from the upper part of the nose. The germs then attack the blood-vessels of the nervous system. The blood-vessels are obstructed and the blood-supply to the nerve-cells is shut off. The spinal cord and connecting nerves degenerate and paralysis of muscles ensues. Susceptible persons, mostly infants, take the disease through entrance of the germs into their noses and throats. These germs exist in the discharges from the nose, throat, and bowels of patients, convalescents, attendants, or healthy carriers. They are conveyed to the healthy by means of soiled fingers, soiled household utensils, soiled towels and handkerchiefs, contaminated food, and flies. One may inhale the germs in air by standing near a person who is coughing or sneezing—if he has them in his throat.

After entrance of the germs into the body the disease develops within two to fourteen days—usually eight. The germs may be carried as long as six months in the throat by convalescents or healthy exposed persons. The latter may not take the disease at all.

There are many different forms of the disease, and no attempt at diagnosis will be made here, since even the elect are often puzzled.

In the more usual case the patient feels dull and disin-

clined to play or work and fever soon appears. The whole body is sore and painful, and children cry on being moved. There may be convulsions in children, with squinting of the eyes, retraction of the head, and stiffness of the back muscles, headache, and vomiting. After one to three days of fever the characteristic paralysis appears. This may be of one leg and one arm, or both legs or arms, or of all the extremities. More often one leg is paralyzed and there is either involuntary passage of the urine and bowel discharges or the urine may have to be drawn with a catheter. The fever and other symptoms pass away, but the paralysis remains unchanged for two or three weeks, and then improves during the following months, but usually some groups of muscles begin to waste away and the limb may remain permanently much smaller than its fellow. When only certain muscles are involved they wither and deformity results. Club-foot, where children walk on the heel with the toes drawn up, or on the toes because the heel is drawn up, is a common result. Such deformities can now-a-days be quite successfully remedied in many instances. The danger to life is not great, varying from 4 to 15 per cent. mortality (20 per cent. in 1916 epidemic). About one-fifth of the cases make complete recovery.

Prevention.—Apparently infantile paralysis is only communicated by contact of the sick and carriers (or by objects they have soiled with their discharges) with healthy persons.

The patient must be isolated for six weeks, and also the other members of the family, and exposed persons should be quarantined (except bread winners) for a period of two weeks, while children should not return to school for two months. It is not possible to determine who are carriers by taking some of the secretion from the nose and throat for examination, as in diphtheria and cerebrospinal menin-

gitis, because the germ is too small to be seen microscopically. If possible healthy children should be isolated away from centers of infection in the country during epidemics, and should be prevented from associating with other children. The kissing of children should also be thwarted.

The discharges from the nose and throat of patients should be collected on cloth in a paper bag and burned, and the bowel discharges and urine should be disinfected as in typhoid fever. Bed and body linen and eating utensils should be boiled for ten minutes or more after use. The hands of the nurse should be frequently washed in soap and water. The sick room must be screened from flies and regularly disinfected after recovery of the patient. Persons exposed to the disease should spray their throats three times daily with hydrogen peroxid 1 part to 3 parts of water; or a snuff consisting of salol 65 grains, menthol 1 grain, and boric acid 5 drams is recommended (Dr. Dunn) for use instead of the spray, a pinch to be sniffed up into each nostril thrice daily. The use of urotropin (5 to 15 grains in a whole glass of water three times a day) for the exposed members of the family may protect them in acting as an antiseptic in the excretions and secretions, as in cerebrospinal meningitis. Unfortunately, there is no certain special means for either preventing or curing infantile paralysis at the present time.

The dangers of contagion are greatly magnified during epidemics of infantile paralysis. It is not readily communicated and is said to be but one-fifteenth as contagious as scarlet fever.

CHAPTER VII

COMMON LOCAL TROUBLES AS A SOURCE OF SERIOUS GENERAL DISEASES

Importance of Infections of Nose, Mouth, and Throat.—Life is usually ended by infections or germ diseases. An infection does not mean simply the presence of germs in a part, but their growth in the tissues, with the accompanying formation of poisons producing the symptoms of inflammation, which is usually synonymous with infection. Smithies, at Rochester, Minn., found that 80 per cent. of dyspeptics had pus germs in their saliva. But these may theoretically exist in the mouth without actually producing infection or inflammation, unless injury to the mouth by food, hot drinks, sharp teeth, low vitality, or some other exciting cause enables them to "take hold" and grow. As a matter of fact, it is probable that in most of these cases the germs were present as the result of inflammation, since but 20 per cent. of persons have normal mouths (Mayo).

More and more may the so-called constitutional diseases (supposed to result from unknown functional disturbances of the whole system) be attributed to the action of germs, as rheumatism, Bright's disease of the kidneys, anemias, and even diabetes. Formerly, the origin of these diseases being wrapped in mystery, they were accepted alike by doctors and patients with a resigned fatalism. But progress in science is illuminating these dark spots in medicine and offering means of prevention and cure. During the past few years the remarkable researches of Rosenow, and the

teaching of such leaders in medicine and surgery as Billings and Charles Mayo, have pointed to local infections of the nose, mouth, and throat as the chief sources of serious acute and chronic disease in many parts of the body. This knowledge cannot be too widely or forcibly impressed upon the intelligent layman, because of its tremendous significance and common application.

It is generally appreciated that the nose and mouth are the openings in the body through which the germs of most infectious diseases enter. Typhoid fever, pneumonia, tuberculosis, diphtheria, epidemic meningitis, dysentery, cholera, measles, scarlet fever are a few examples of diseases which gain entrance by these portals. It has been well known that the mouths of healthy persons always contain a great variety of germs (fifteen, besides many other accidentally present). But only recently has it been actually demonstrated that the presence of germs in acute or chronic inflammatory disorders of the nose, throat, and mouth are capable of being carried by the blood to various parts of the body, there giving rise to the most diverse diseases, the source of which has been hitherto an enigma.

The more common local inflammations in the head, which are responsible for damage to the system at large, are tonsillitis, Riggs' disease affecting the gums and roots of the teeth, abscesses about the roots of the teeth from decay, etc., and nasal catarrh extending to the adjoining cavities (sinuses) in the bones of the face and forehead. These diseased conditions are not by any means easy to determine in all cases, and the services of the physician, nose and throat specialist, dentist, and *x*-ray specialist may all be required to secure a proper diagnosis. For instance, simply looking at the tonsils is not sufficient. The bands forming the entrance to the throat must be pushed aside to expose the tonsils, and these should be pressed upon to

squeeze out any inflammatory secretion. It may usually be taken for granted that persons who have had repeated attacks of acute tonsillitis or quinsy are almost sure to have chronically diseased tonsils. Enlarged tonsils and adenoid growths are usually diseased also and should be removed. Again, regarding abscesses about the roots of teeth: These may be caused by infection from decay, irritation of improperly placed crowns or bridge work, by poor dentistry in allowing space for food to collect between the teeth, and, strange to say, in most cases there are not sufficient pain or tenderness in the diseased tooth to enable the patient or dentist to locate the exact site without an *x*-ray picture. Ulrich, of the University of Minnesota, finds abscess about the roots of teeth in 80 to 88 per cent. of adults by means of the *x*-ray. They occur at the ends of the roots in 68 per cent. of teeth in which the nerve has been killed.

The same difficulty may apply to the detection of Riggs' disease and disease of the sinuses in the head. While tenderness of the teeth and gums and escape of pus along the edge of the gums on pressure are ordinary signs of Riggs' disease, yet in some instances the most expert knowledge may be necessary to detect the condition.

Inflammation of the sinuses usually demands examination by the nose and throat specialist for its determination. The symptoms of these diseases are considered under their titles elsewhere in this book.

But in other parts of the body away from the head local infections may also lead to serious remote diseases. Thus, chronic inflammation of the appendix and gall-bladder, of the urinary and female sexual organs, may be included in this category. The germs from even slight local infections, as, for instance, from wounds of the fingers or of an ingrowing toe-nail, have been recorded as producing the most serious disorders in remote vital organs by trans-

mission through the blood. How frequently germs inhabiting the bowels may produce chronic disease of remote parts, as of the joints, blood-vessels, heart, kidneys, and blood, is uncertain, but this source is accepted by many authorities. In this connection it may not be amiss to mention a common experience that persons having a chronic appendicitis are often attacked a few years later with inflammation of the gall-bladder and gall-stones. Whether the germs in the inflamed appendix reach the gall-bladder by transmission through the lymph-vessels, or whether both troubles originate from germs set free in the blood from local inflammations of the nose, mouth, and throat, it is impossible to say. In epidemics of tonsillitis the simultaneous occurrence of appendicitis among patients has often been observed.

What kind of germs are commonly found in the nose, mouth, throat, and elsewhere which produce serious disease in remote organs?

They are the ordinary germs causing inflammation in wounds and abscesses, the pus germs—streptococci and staphylococci (practically always present in the adult mouth). The germs of pneumonia, or pneumococci, are also common. It has been found that the characteristics of these germs may be considerably changed in their growth in the nose, mouth, and throat, so that they acquire an affinity for certain organs after entering the blood. In this way we explain why certain parts of the body are attacked by germs free in the blood rather than others. The germs circulating in the blood finally lodge in the smallest branches of the vessels in the tissues which they attack.

How do we know that local infections in the nose, mouth and throat, and in other parts will produce serious disorder of remote organs? In the first place, the association of

certain other diseases with inflammations in the throat has been a matter of common knowledge; as, for instance, the combination of rheumatism and valvular disease of the heart, both secondary to tonsillitis. Then the germs found in various organs secondarily diseased are the same as those occurring in the primary focus of inflammation in the head. Recently diseases never before attributed to or associated with throat or mouth infections have been found to have a causative relation to the latter, because the germs found in the various organs secondarily diseased are identical with those in the original focus of inflammation in the throat. This applies to Bright's disease of the kidneys, ulcer of the stomach, inflammation of the gall-bladder, appendicitis, etc. Moreover, when germs from infected human tonsils are injected into the blood of animals the same organs are attacked as those secondarily diseased in man with tonsillitis; that is, the heart, joints, stomach (ulcer), gall-bladder, and appendix.

And, finally, surgical removal of the local infectious foci in the nose, throat and mouth, or elsewhere is often followed by improvement or recovery from remote diseases which have been found experimentally and in practice associated with such nose, throat, and mouth infections. Thus, the cutting out of diseased tonsils may be the means of curing rheumatism and valvular disease of the heart.

It would be absurd to affirm that all sufferers from local infections in the head are doomed to acquire serious remote disease, for most persons have more or less chronic infections about the nasal passages, mouth, and throat. But the possibilities of such troubles should be recognized by the laity in order that proper attention be given to treatment. If left to persist, any depressing circumstances, as colds, dissipation, financial or social disasters, overwork, poor food and surroundings, may so weaken the resistance

of the body that the escaping germs in the blood may attack some vital organ.

For instance, there is a most painful and serious inflammation of the bones frequently mistaken for rheumatism (osteomyelitis). It begins with the severity and suddenness of appendicitis, and in twenty-four hours may destroy the bone of the leg or thigh, so that amputation or death may result. This condition doctors have described as "idiopathic," a cloak for ignorance as to its origin. Now we know that it is due to infections about the nose and throat, colds, sore throat, or tonsillitis, and occurs perhaps a week or two after recovery. But this point I wish to emphasize, that the bone trouble is precipitated by a slight fall or injury to the limb in many cases. An injured point always weakens resistance to infections from within or without. In other words, the germs from the inflammation in the throat have entered the blood, and a slight local injury may be the means of their selecting the bones for the site of their growth. First, the cold, next the injury, and then a disease fatal to life and limb, unless treated at once and understandingly.

A categoric list is never interesting, but it will be of advantage to impress the layman more specifically with the results of the apparently unimportant local infections under consideration. By direct extension—that is, the direct transmission of the germs from the infection in the nose, mouth, and throat through the natural drainage spaces and canals in the tissues (lymphatics)—the glands of the neck (the normal catch-basins in this system) become enlarged and tender. Swollen glands or lumps under the ear or jaw are the most common complication of mouth or throat infection. But we are chiefly concerned with the more remote dispersion of the germs after they enter the blood and are carried to other parts of the body. One of the

most frequent results is a condition in which acute inflammation of the joints, or acute rheumatism, is associated with valvular disease of the heart. Indeed, it has been shown that certain strains of streptococci from tooth abscess and tonsil inflammation, after their escape into the blood, have a special predilection for these tissues—the joints and heart valves. In fact, all joint inflammations (except those due to gout or direct injury) are probably of germ or infectious origin, although usually masquerading under the meaningless name of rheumatism. Many cases may be ultimately cured by first removing the cause in the mouth or throat. In childhood there may be also an added complication—chorea or St. Vitus' dance—to the rheumatism (?) and heart disease. More often one of these diseases occurs separately with tonsillar infection. The writer has had recently under his care a boy suffering from mild chorea and valvular disease of the heart, associated with chronic tonsillitis, from which he has wholly recovered since removal of his tonsils. Germs in the blood from diseased tonsils attack the valves of the heart and set up inflammation and distortion of the valves, which then fail to close and become leaky, as would an ill-fitting valve of a pump.

The lodgment of the same germs in the finest blood-vessels of the joints and nervous system from the infected mouth or throat gives rise to the rheumatism (?) and St. Vitus' dance.

It has only lately been discovered that many nervous disorders originate apparently in the same way from germs in the blood derived from the infected nose, mouth, or throat, such as neuritis, and possible melancholia and disturbances of sensation in the limbs (feeling of pricking by needles and pins).

It has recently come to my knowledge that a patient who

has been the medical rounds for constant pain in one arm, from neuritis, has been wholly cured by removal of diseased tonsils. Goiter, or swelling of the gland that lies under the "Adam's apple" in the neck, is another disease of doubtful origin. In some cases at least this trouble appears to arise from infection with germs in the blood derived from diseased tonsils. The same remark applies to a very serious disorder with swelling of glands in various parts of the body (Hodgkin's disease).

The cause of gall-bladder inflammation, gall-stones, appendicitis, and chronic ulcer of the stomach and first part of the intestines has been the subject of much speculation, experiment, and controversy, but these disorders may be reproduced in animals by injection into their blood of streptococci from diseased human tonsils, and, moreover, these same germs are found in the diseased human gall-bladder and ulcerated stomach and intestines. Thus, apparently we have a positive demonstration of at least one of the causes of these diseases.

Some of the inflammations in the nose, throat, and mouth are due to the germs of pneumonia, and while these may be constantly present and may not produce pneumonia, yet it is to the escape of germs into the blood from these sources that we must attribute pneumonia in some instances.

A certain percentage of the tonsils (15 per cent.) removed are found to be infected with tuberculosis germs. Tuberculosis of vital organs, as the lungs and kidneys, may arise from entrance of the tubercle germs into the blood from tuberculous tonsils. The streptococci, so often the cause of inflammations in the mouth, nose, and throat, are also the source of erysipelas and rashes which resemble scarlet fever.

The so-called idiopathic (cause unknown) cases of ery-

sipelas may, in fact, be due to primary inflammations in the nose, throat, or mouth.

When diphtheria antitoxin (horse blood-serum) is injected at long intervals into a human being he may rarely develop sudden and alarming symptoms, with difficulty of breathing and evidence of lack of air or oxygen. This follows because the system has become so sensitized to this foreign substance that a later dose may produce the most alarming condition. It is now thought that the system likewise becomes sensitized to the poisons constantly produced by the growth of germs in chronic inflammations in the nose and throat, and the result is difficulty in breathing and asthma, or skin eruptions (nettle-rash), such as are seen in poisoning by antitoxin. Asthma is frequently cured by removal of diseases in the nose and throat.

Particular emphasis must be laid on the fact that not only the head infections, but any local focus of infection anywhere in the body constitutes a constant menace to the host. The nose, mouth, and throat infections have been especially dwelt upon because they are so common and familiar. There are fashions in medicine, as in clothing, and the profession continually suffers from kangaroo-like mental jumps in its action over new discoveries.

Perhaps, as the result of recent researches in head infections, too many comparatively healthy tonsils may be removed without reason.

When they are unquestionably infected they should be cut out, and all means should be exhausted in extirpating all apparently unimportant infections anywhere in the body to avoid remote serious disease of vital organs. There is an ancient proverb—"Study sickness when you are well." This is even truer in the case of the near-well.

Tonsils and Adenoids.—While the cause of enlarged and diseased tonsils and adenoid growths is not absolutely

determined, it is probable that breathing a bacteria-laden air may produce these conditions in schools or whenever individuals are crowded together in ill-ventilated rooms.

However, enlarged tonsils and adenoids are the first signs we have, and these are commonly called to our attention owing to frequent attacks of cold or tonsillitis or by mouth-breathing. Any layman can tell by looking into the back of the throat whether the tonsils are enlarged (Fig. 2, *A*), be-

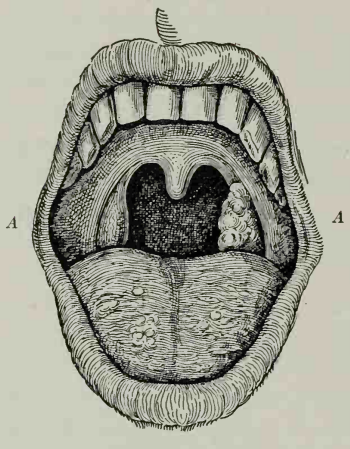


Fig. 2.—*A*, Enlarged and diseased tonsils. The normal tonsils are invisible. (Redrawn after Matthews.)

cause in health they are not visible at all (as projections on either side of the entrance to the throat). Adenoid growths cannot be seen, but fill the region at the back of the nasal chambers where these join the top of the throat (Fig. 3, *A*). When the tonsils are enlarged in children it is safe to infer that adenoid growths also occur. The only efficient treatment is by surgical removal, in children under ether, and in adults under cocain or ether. Only within a few years has it

been customary to do more than slice off the outer part of the tonsils, but it has been found that the tonsils enlarge again after this operation, and that the scar covering the remaining stump of the tonsil seals it over and retains germs and poisons in the tonsil which are then all the more likely to be absorbed and to poison the system. The only proper procedure is complete removal of the tonsil, which is a much more difficult operation and requires the services of an

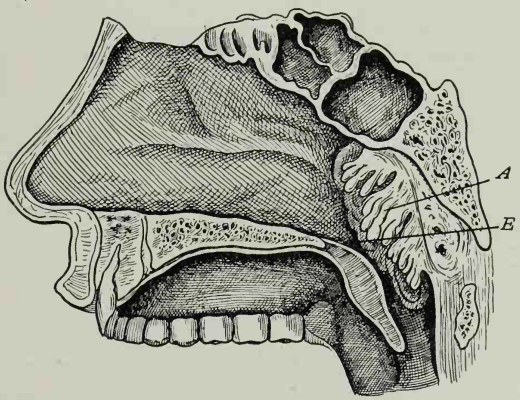


Fig. 3.—*E* shows about the level of the eustachian tube connecting the throat with the ear. The adenoid growth (*A*) blocks up, or causes mucus and swelling to block, the eustachian tube and induces deafness among other troubles (Zuckerkandl).

expert throat specialist in most instances. As adenoid growths interfere with breathing, and therefore the general health, produce deafness by stopping the tubes which lead from the upper part of the throat to the inner region of the ears, and favor abscess of the inner ear with its frequent extension to the bone of the skull back of the ear (mastoid process), and then to the brain, it will be seen that there are more than sufficient reasons for the removal of diseased

tonsils and adenoids—when such is without danger and without any bad consequences.

Nor is the train of consequences caused by the presence of adenoids by any means exhausted. The obstruction to breathing leads to many other troubles. Thus the face becomes dull and stupid and the mouth is held open, imparting a vacant expression to the face. The upper jaw is narrowed, the roof of the mouth becomes high, the lips are

Fig. 4.—Expression in adenoids (Frühwald).

thick, and the entrance to the nostrils is slit-like and has a "pinched-in" appearance. The breathing is apt to be noisy and snorting at night and screaming and shortness of breath during sleep are common. Alterations in the shape of the chest follow, as the narrow, pointed chest, or what is called chicken- or pigeon-breast; or, if there is asthma, the chest becomes rounded; and occasionally a depression forms at the lower end of the breast bone. The nasal

voice is an ordinary accompaniment. Headache, frequent colds, loss of energy and backwardness, dulness and stupidity at school are characteristic. The habit of making facial grimaces may be cured by removal of adenoids and tonsils.

Foul breath is often due to accumulated secretions retained in diseased tonsils. It is unnecessary to refer again to the dangers resulting from decayed teeth, or infections about the teeth or Riggs' disease, as these should be remedied by constant cleanliness, and may be prevented by visits to the dentist at monthly intervals for thorough removal of tartar and polishing of the teeth so that no foreign substances will adhere to them. Decayed teeth and Riggs' disease require special treatment. As noted above, an *x*-ray examination of the jaws is the only certain method of determining the presence of diseased teeth in doubtful cases. The presence of crowns on roots in which there is any infection may favor general disease by permitting absorption of germs or their poisons into the blood.

Chronic inflammation of the gall-bladder and appendix also call for surgery, as no other treatment is of value. But while the disturbance of digestion and local complications (see Cancer, p. 174) are chiefly feared, the danger of permanent damage to the heart, kidneys, and other internal organs (owing to germs from these organs set free in the blood) is frequently neglected. Inflammation of the female organs and of the urinary apparatus in both sexes must receive appropriate treatment to avoid complication of the systemic diseases we have noticed. Occasionally some unusual local infection, as in the case recorded by Billings, where the formation of pus about an ingrowing toe-nail led to an attack of rheumatic fever, may be responsible for serious general disease and must not be overlooked.

The gist of the whole matter is that some apparently

trivial local diseases about the mouth and throat may have the most far-reaching and important consequences, and that local infections in any part of the body have the same significance and should never be permitted to persist untreated. Whoever is a sufferer from such chronic ailments as chronic heart, joint, or kidney disease should be thoroughly examined from head to foot—literally—for some source of local infection, and all the modern tests, such as the *x*-ray, microscope, test-meals followed by emptying the stomach, etc., may be necessary to discover the cause.

But still more to the point is it that persons having one of the local diseases about the throat or elsewhere should seek its removal before serious organic disease in other parts of the body is secondarily caused thereby. Because one has had enlarged and diseased tonsils for years, and has escaped any of the direful consequences herein described, is no proof of their harmlessness. Parents are apt to point to themselves as examples when urged to have similar faults remedied in their children. Experience (of the profession) teaches "one swallow maketh not summer."

Riggs' Disease.—We have in another place (see page 22) discussed abscess formation about the roots of teeth, or between the roots and the gums, in pyorrhea or Riggs' disease. The abscesses at the very tip of the roots, which occur so commonly in teeth in which the nerve has been killed, can only be certainly discovered by *x*-ray pictures. Dentists have been teaching their patients that all teeth should be saved when possible. But these teeth abscessed at the end of the roots may give no pain and yet be the means of causing serious disease from absorption of pus into the blood.

Dentists must change their methods, and not wait until

a physician finds some secondary disease in joints, heart, etc., due to a slow absorption of pus germs from abscessed teeth which has been going on probably for years. They must take *x*-ray plates of teeth in adults as a routine practice so as to avoid waiting until irreparable damage has been done. They must also alter their principles about saving teeth, because in many cases only extraction will cure. In treating dead teeth with abscess at their roots by boring down through the tooth, as has been the custom, it has been found by the *x*-ray, and by pus later breaking out through the gums, that such treatment has often not been successful.

Finally, it may be reasonably objected that we make much ado about nothing when a large proportion of human kind have infections about their teeth and remain healthy. It can only be said that unless all of us had possessed great natural resistance against infections we would not now be alive.

The large percentage of sufferers from the remote effects of mouth infections is only just beginning to be appreciated by the profession, while about ten years more will be required to educate the public in this matter.

CHAPTER VIII

THE PREVENTION OF CANCER

INTRODUCTORY NOTE

Cancer of the lip, tongue, and *inside of the mouth* is largely preventable. It occurs in smokers and in those with rough teeth who do not take proper care of their mouths. Syphilis is present in a small percentage of cases. The precancerous conditions usually consist in the appearance of one or more white spots or patches or ulcers in the mouth; or, on the lip, of a small black area (burn), or a thickening or warty growth. These commonly produce some pain or discomfort.

If smoking is immediately stopped, the teeth put in order, and if saleratus is used frequently as a mouth-wash the trouble may heal at once. If it does not heal within two or three weeks the diseased area should be cut out by a competent surgeon who will know whether or not to remove the neighboring glands.

Cancer about the mouth may thus be avoided in most cases by following these simple rules.

Cancer of the skin originates in pre-existing tumors, moles, birthmarks, warts, and scaly, thickened patches (keratosis). These, as a rule, should be removed with a knife or cautery, including a good margin of healthy skin, and the removed tissue should be then examined microscopically. Any local skin defect—as an ulcer, wart, tumor, scaly, thickened patch, or discharging aperture on the skin—must be regarded as precancerous. It matters little whether the cause be injury, tuberculosis, or syphilis of the skin, or keratosis due to exposure to the sun or lead or arsenic, the possibility of cancer is about the same. If such areas are healed or cut out cancer may be avoided. Cancer of the skin, therefore, is a preventable disease.

Cancer of the Breast.—Not knowing its cause, we have no means of preventing or treating it until a lump appears in the breast.

When such lumps are at once removed on their discovery half will be found benign (not cancerous). Only 1 per cent. of lumps in the breast are malignant under twenty-five years of age. Every lump in the breast of a female over twenty years should be explored. When benign, its removal will absolutely prevent cancer.

The chances of permanent recovery in true breast cancer—if removed on its discovery—depend upon its kind. If adenocarcinoma, recovery should occur in 96 per cent. of cases; if a cancer cyst, or in the scirrhous or medullary form, 86 per cent. have been permanently cured—providing the growth is removed by the complete operation as soon as discovered. The chances of recovery grow less and less as the delay is more and more protracted until the cancer is incurable from the extent of the local or general involvement (metastasis).

When all the women have this knowledge and seek the physician at once, and when he acts promptly, and the proper surgery is immediately done, the number of deaths from cancer of the breast will be tremendously decreased.

Cancer of the Thyroid.—If, in individuals over twenty, every irregular lump of the thyroid gland (situated directly below the "Adam's apple" in the throat) was removed as soon as found cancer in this region would be practically unknown. Cancer here begins as a benign growth, and if removed before the surrounding parts are involved, general or local recurrence will not occur.

Sarcoma of Soft Parts.—Lumps under the skin in all parts of the body should be removed, as it is impossible to tell the benign from the malignant. No harm is done by removing benign growths and there will never be a better time to remove sarcomata. Surgery must be thorough and the growth must be removed surrounded by a wide margin of healthy tissue—not merely shelled out.

Sarcoma of Bone.—Early intervention offers the only hope of cure. Pain at one point in a bone or joint, especially after injury (continuous or at a later date), demands *x*-ray, blood, and urine examination. In my experience the first thing to be done is that done last and too late for the cure of malignant disease of bone or joint.

Cancer of the womb is largely preventable. The majority of cases begin at the outlet (cervix) in women who have borne children. Every woman should keep a careful watch and record of the character and periods of menstruation, and on observing anything un-

usual, should submit to a careful examination. The reappearance of bleeding after the change of life is a message requiring immediate attention. Doctors may also prevent cancer of the womb by better obstetrics, by careful examination of women after childbirth, by early repair of lacerations, by correcting displacements and endometritis—thus avoiding precancerous conditions.

Cancer of the Stomach.—If it is true that a large percentage of cancers of the stomach develop on pre-existing ulcer, then it is a preventable disease. Ulcer of the stomach is regarded by patients as "indigestion" and does not receive early expert attention, and many doctors begin with treatment instead of thorough examination. I believe the best treatment in simple gastric ulcer consists in prolonged rest and a semistarvation diet.

Cancer of the Colon (Large Intestine).—This may not be a preventable disease, but if recognized and removed early it is one of the most curable forms of cancer. In the left colon acute obstruction leads to early intervention, but in the right colon the fluid contents do not favor obstruction and discovery of cancer is late. However, patients do have symptoms for months and years before obstruction, and wide-spread growth occurs, and proper examination in this period will bring out indications for operation.

Cancer of the Rectum and Lower Bowel (Sigmoid).—The early discovery of this condition rests largely with the doctor in making an examination by finger or instrument (proctoscope) because, as a rule, the patient seeks advice early.

Many types of cancer are preventable and most malignant growths may be recognized early. In this period surgery offers a large probability of permanent cure. The difficult problem is how to convey the information to millions instead of hundreds, and how to get them to act on this information. A book of this character will have a large influence for good—especially among the reading public and profession. My own intensive study of the educational propaganda has forced me to conclude that the individual doctor is, on the whole, the best medium for spreading this knowledge. He should feel that it is part of his professional duty to educate all individuals who seek his advice about personal hygiene, and should give them that information which will allow them to recognize possible diseases early.

JOSEPH COLT BLOODGOOD.

This matter I regard as by far the most important and vital subject treated in this book, since it has been the predominant thought and endeavor of medical men throughout the world for many years.

Only within the past six months have articles appeared on this subject by three of the leading surgeons of America —Drs. Mayo, Bloodgood, and Rodman.

While the essential cause of cancer is unknown, many facts of vital value have come to light. Thus, cancer is certainly not a blood disease or disorder of the general system, but is a truly local trouble.

Maurice Richardson's maxim that every cancer is curable at some stage of its existence is now generally accepted. Then, again, it is known that, whether cancer is due to germs or not, local irritation is the essential first stage of cancer, or what has been called the precancerous stage. The precancerous stage may merely mean a state of local chronic irritation anywhere in the body, although, strictly speaking, it should describe the earliest microscopic changes in the tissues recognized as cancer. We shall use the term in its wider rather than in this stricter interpretation. The precancerous conditions are becoming very well known, and the surgery of such conditions is safe and their removal by this means accomplishes a certain cure of cancer in practically all cases. This is the present hope which the medical profession has to offer, and in so far as it is accepted and acted upon by the profession, in so far will cancer disappear, for it is a preventive rather than a curative measure. Cancers may be divided into four classes:

(1) The class in which a certain diagnosis cannot be made before operation. (2) The class in which diagnosis is reasonably probable before operation. (3) The class in which the disease is so far advanced that there is extension

to some of the neighboring glands, but, nevertheless, the case would be considered best treated by operation. (4) The inoperable class, in which the disease has become general and in which local removal has become impossible.

If all cases of cancer could be treated in the precancerous stage (of the first class) the cures would be certain and recurrence would be unknown. These conditions are recognized at the time of operation by the microscopic section, and occasionally by the appearance and feel of the tissues removed. Thus, it is not uncommon to discover cancer beginning in an inflamed appendix, gall-bladder, ulcer of the stomach, or in a lump in the breast by microscopic examination after removal which could not by any means be determined prior to operation. Such cases are always cured if they are in strictly the precancerous stage, but as the patients are ignorant of their condition, often not being told after the operative discovery, it is impossible for them to realize that they have been cured of cancer, and the public cannot be impressed by such cures.

In the second class of cases the chances of recovery are immensely greater than the third class. For example, in cancers where the disease has extended to the neighboring glands the chances of recovery are diminished by 75 per cent. Thus, in cancer of the breast the returns at the Mayo and Johns Hopkins clinics show that before any glandular lumps have formed in the armpits about 80 per cent. of cases are well five years after operation. But when the operations are done after these lumps in the armpits have occurred, the percentage of five-year cures is reduced to 25 per cent. We, as a profession, are as much to blame as the laity for the fearful frequency of cancer. There are some 80,000 deaths from cancer annually in the

United States, and probably half of them might be prevented with the knowledge we have today—by attacking the precancerous conditions to be described. In England, where the statistics have been kept more accurately for a longer period than in the United States, it has been found that 1 in every 7.4 women and 1 in every 9.7 men over thirty-five die of cancer (Hoffman).

The same statistics apply in this country, according to the leading surgeons. That cancer kills 1 in 7 women and 1 in 11 men over thirty-five years of age is common knowledge (Bainbridge). In the United States in 1912 of deaths over thirty, 1 in 11.5, and of deaths over forty, 1 in every 10.5 persons was from cancer (Taylor). The proportion is larger in women on account of their liability to cancer of the womb and breast. One-third of all the cases of cancer are in the stomach.

The researches of the Pennsylvania Cancer Commission shed a strong light on the reasons for the unfortunate cancer condition.

They gathered together valuable statistics concerning 400 cases of cancer, and found that 68 per cent. of operable cancers were on the surface or in cavities, as in the outlet of the womb and in the mouth, where they could be readily seen, and the remainder of the operable cancers were deeply seated, but in both groups over a year on the average had elapsed after the patients had consulted their family physicians before they were referred to the surgeon. As it has been discovered that about this time, or less, is required for extension into the neighboring glands, so that they may be felt as lumps by the examining doctor, and as this is the chief reason why physicians delay in such cases—to make a certain diagnosis—the cause of the awful result is easily seen.

By this watchful course, which is only made possible by

the patient's ignorance and inherent dread of operation, the doctor has caused the patient to have but one chance of cure in four, instead of having three chances of cure in four, as he would have had before the diagnosis became absolutely certain and plain to the veriest medical tyro. Therefore when a doctor waits in suspected or possible cancer for all symptoms to develop so that the diagnosis becomes absolute, he is almost criminal. The early precancerous conditions *must* be doubtful to be permanently and successfully removed.

Nothing is lost by operating in this stage except the comfort of the patient, and what is this beside a possible life of pain and death from cancer? Surgeons are daily confronted with the results of watchful waiting in cancer, and these cases constitute the dread of his career.

In 13 per cent. of cases of cancer of the breast the family physician advised watchful and suicidal waiting, and in 20 per cent. of the cases of cancer of the stomach and womb similar bad advice was given, and no local examination in either disease was made in 10 per cent. of the patients.

At Johns Hopkins it has been found that 84 per cent. of the cases of cancer of the breast do not come to operation until the glands in the armpits are enlarged so that lumps may be felt there. At present, operation leads to from 10 to 50 per cent. of cures in cases of operable cancer of all kinds, while 25 per cent. of cases of cancer of the bowel and stomach are curable, and 50 per cent. of cancers of the breast—the cures being based on the patients remaining well five years after the operation (Rodman).

But some cancers are more readily cured by operation than others. Thus, at the Mayo clinic 93 per cent. of the cases of cancer of the lip are reported as cured by their very thorough operation. If surgeons should refuse to operate in advanced cases of cancer, operations for all

cancers would be much more readily and profitably accepted by the public. Deaths in advanced cancer do not occur from the effects of the operation in most cases, but from the disease. But such deaths deter early cases from operation because patients recall the death of friends from cancer after operation and wrongly attribute the result to the operation. If surgeons only operated on precancerous and early cancerous conditions, the results would be so remarkable that the benefit to the world would be inestimable—as object lessons. But humanity demands a fighting chance, and alleviation of suffering is often the only object sought now in truly inoperable cases.

It is, indeed, a fearful state of affairs which is reported by leading surgeons, as by Childe, that 90 per cent. of the cases of cancer of the womb are so far gone as not to be operable when they first come to him, and that the same percentage of patients with cancer of the stomach are inoperable when they first present themselves to Munroe and Bottomley. Dr. William J. Mayo finds that one-third of the cases of cancer of the stomach coming to him are curable by operation, but in his clinic many cases are discovered by elaborate means of diagnosis in patients seeking relief for various diseases. His statistics are the most encouraging in this disease—38 per cent. of the patients operated on for cancer of the stomach are well at the end of three years, and 25 per cent. are alive and well at the end of five years.

The results of the treatment of all kinds of cancer would be infinitely better today if patients would apply for relief at an early stage of the trouble, and it is the object of this article to point out the precancerous conditions which should warn the patient to seek immediate surgical advice.

Of course, in the precancerous conditions of the skin and surface of the body recognition is the rule in the earliest

stages, and these should be cured by the slightest operations and with the best chance for certain permanent cures.

Local irritation as a cause for cancer has recently been forcibly presented in an address before the American Surgical Association by Dr. W. J. Mayo. In it he brought forward many known forms of local irritation productive of cancer, and mentioned the betel-nut chewers of India. Cancer of the mouth is so common from the irritation of this substance that in 976 cases of cancer from all the causes in the Madras General Hospital nearly 50 per cent. were located in the mouth. And, again, the influence of heat irritation was adduced, as exemplified by the frequency of cancer on the shins of locomotive drivers, and in the natives of Kashmir, who wear hot Kangri fire baskets next the skin of the lower abdomen in winter. Among some 2020 tumors in the Kashmir Mission Hospital there were 363 cancers caused by the burns of these baskets on the abdomen. Constant exposure to the *x*-rays has been a notable source of cancer among medical men. Local irritation, or some form of skin trouble, preceded every one of the 820 cases of cancer of the skin and mucous membrane reported by Professor Bloodgood. Malignant tumors frequently arise from blows. Dr. Murphy states that a single blow on the breast is not uncommonly followed by the appearance of cancer in women. Warts and dark moles on the skin, especially when subjected to irritation through rubbing of the clothing, scratching, or pressure, are well recognized precancerous conditions; this fact was emphasized in a (now classical) paper by Professor Keen delivered in 1904. He showed that the cancerous change frequently occurred some thirty, forty, or even fifty years after the existence of the wart or mole, and that, as there was no special reason why the growth should be removed today rather than tomorrow, or this year rather than next, it was allowed

to remain until some local irritation, such as combing a wart on the head, or through the pressure of a hat or rubbing of a collar on a mole of the neck, the wart or mole suddenly took on a growth which in most cases was malignant. The moral is to remove such at the first opportunity, but if there are many warts or dark moles on the body the subject may wait until there is the slightest sign of irritation or growth in any wart or dark mole, when it should be immediately removed by a surgeon. The habit of partially removing such growths by scraping them off the skin and leaving the base is illustrated by a case coming to the attention of the author, where a mole became irritated and was partially removed, and a general malignant disease of all the internal organs followed within a month or two.

Warts or moles should be removed properly with their skin bases by a surgeon after the injection of cocain. Cancer of the lip is rarely seen except in smokers, and is thought to be due to the heat or pressure of the pipe stem. In the mouth white patches form on the tongue and inside of the lips and cheeks—more usually on the tongue in smokers—and this condition quite often becomes cancerous unless smoking is stopped and the white patches are cauterized. The constant taking of hot food or drink may produce dangerous irritation in the mouth.

Parts subjected to blows should be carefully watched and operation should be done on the slightest sign of malignant disease. Coley has found a history of previous injury in about one-third of 328 cases of cancer.

Cancer of the breast, so common in women, has a very bright outlook when the tumor is removed early—before spread of the disease into the surrounding tissue and the glands in the armpits—as we have seen. Any lump in the breast demands the immediate attention of a surgeon.

There are no means by which the innocent lump may be distinguished from the malignant tumor in many cases. The inflammatory lump or the innocent tumor frequently become malignant in time.

It is common practice for a physician to find a movable lump in the breast of a young woman, and tell her to come back in six months or some other time, adding there is nothing he can see to worry about. There is nothing that anybody can see to worry about, but there may be something very serious that no one can see or feel to cause worry. If such a lump is removed and found innocent the operation is neither dangerous nor disfiguring, and the patient has the satisfying knowledge that there is no danger from that source in the future. If it is allowed to remain, danger threatens, and the lump *ought* to be a continuous cause of anxiety. A typic cancer occurs in a woman of middle age or over, is situated in the upper and outer part of the breast, and is not painful or tender at first, but later may become painful. After a time the tumor becomes fixed in the skin and may cause dimpling of the skin or a drawing in of the nipple, and then the tumor is not freely movable. The tumor is best felt not by pinching up a fold of the breast, but by pressing the surface of the breast with the open palm against the chest while the subject is lying flat on her back.

But there are all kinds of exceptions to this description. A sore on the skin or irritation of the skin about the nipple, or a discharge from the nipple, should lead a woman to consult a surgeon at once.

Patients in their twenties may have cancer of the breast, it may occur in any part of the breast, pain may be the first symptom, it may be freely movable and not possess the slightest suggestion of cancer, or it may appear inflammatory. At the risk of repetition, for it cannot be too

strongly emphasized, a woman with a lump in her breast should go at once to a competent surgeon for advice. The modesty which causes the patient to hide her trouble until it begins suddenly to grow apace is terribly false and mistaken. A tumor of the breast which has caused no trouble for months or years, and then begins to rather rapidly enlarge is almost invariably cancer, and the chances are that the surrounding tissue will be so invaded that the likelihood of cure will be much reduced. Almost one-third of the patients with cancer of the breast now come to surgeons when the growth has already advanced to a stage when operation really offers no hope of cure.

Cancer of the Stomach.—As we have seen, the stomach is the most common situation of cancer in the whole body; one-third of all the cancers originate in this organ. Dr. Mayo has pointed out that cancer of the stomach is uncommon in animals and savages, that there is something in the habits or preparation of food which favors the occurrence of cancer in civilized man.

Cancer of the stomach can be less readily diagnosed in its earlier stages than any other common form, so that at present but about one-third of the cases—at the best—come to the surgeon in time for successful removal of the growth. But, as we have noted, ulcer of the stomach is the most frequent precancerous condition, and a previous history of ulcer of the stomach is found in more than half the cases by some authorities, while positive evidence of ulcer as a cause of cancer has been proved by microscopic examination in 62 per cent. of cancers of the stomach removed during several years at the Mayo clinic.

So that ulcer of the stomach must be treated to avoid cancer. While this book is not intended as a text-book in medicine, a few words as to ulcer of the stomach may not be amiss. Many cases of ulcer were formerly called ner-

vous dyspepsia. The chief distinguishing feature is the occurrence of pain at a regular time after eating—one-half hour to five hours—which is relieved by food, vomiting, or saleratus, and is accompanied with much gas, heartburn, and acidity. Attacks occur during periods for years and there are long intervals of good health intervening. Medical and surgical cure of chronic ulcer is possible, and such symptoms should not be regarded lightly, if only because cancer may be the ultimate end.

Therefore cancer appears in persons who are having symptoms of ulcer of the stomach, in those who have been well for many years after a former history of ulcer, and in about half of the cases the symptoms of cancer come out of a clear sky in persons of middle age who have previously enjoyed good health. This fact is one of the most suspicious possible—*i. e.*, the occurrence of symptoms of continuous severe indigestion in one of middle age or past who has previously been free from stomach trouble.

Thus, the aggravation of previous symptoms of stomach trouble, or the sudden appearance of them in a person past young adult life, are equally suggestive. The general condition is as characteristic as are stomach symptoms. The patient begins to lose weight, strength, appetite and energy, suffers from mental depression and weariness, and has a sense of "impending evil." There is pallor about the nose, eyes and mouth, and the face has a pinched expression (Graham). Pain in the stomach may be absent, but usually there is a continuous indescribable feeling of distress, worse after eating, with the presence of much gas and heartburn.

Vomiting of undigested food many hours or days after it has been taken is particularly suggestive, especially if some dark blood is present.

The patient may feel a movable lump in the region of the

stomach, and this tumor may be evidence of a rather favorable case for operation.

The new use for the *x*-ray in the examination of the stomach within the last few years has been of much aid in the diagnosis of ulcer and cancer, but should never be employed apart from physical examination by an expert in stomach troubles, as the findings of the *x*-ray must be construed in the light of bedside experience.

Since **cancer of the womb** is common, and the majority of cases (90 per cent.) come to the surgeon too late for satisfactory cure, the importance of the knowledge of suggestive signs cannot be too strongly emphasized nor too quickly acted upon. The occurrence of local irritation here is an important precancerous condition; that is, the existence of lacerations, which are the rule following childbirth. The repair of these is then always essential, if only for the prevention of cancer, although they are a source of many other troubles. Cancer should always be thought of in women of middle age (thirty-five to forty) when there is irregular flowing following severe exertion or at other times. The same condition is common during the change of life, and this causes women to slight the symptom and neglect the trouble when it is in the most curable stage. Women should always consult a doctor and insist on a local examination in any case of irregular flow, even if it be slight.

If such occur after the change of life is apparently past the demand for local examination is even more urgent. A colorless or brownish watery discharge, with or without unpleasant odor, is another suggestive sign. Pain in the lower part of the body or thighs may or may not be present, as well as pain and irritability of the bladder.

The repair of lacerations following childbirth may, therefore, prevent future precancerous conditions, while seeking

advice on the first appearance of the slightest irregularities, as suggested above, may be the means of saving the patient's life in early middle age or at any time thereafter.

In the **abdomen** a chronic inflammation of the appendix and gall-bladder may lead to cancer in these organs; particularly is this so in the case of the gall-bladder. Operations to remove these organs will, therefore, not only cure the appendicitis and gall-bladder trouble, with their accompanying digestive disturbances, but will prevent the possibility of future cancer in these parts.

Cancer on the skin, we have seen, has its precancerous stage in irritation of some already existing skin troubles, as warts, pimples, and moles, or scaling or scurfy patches in old persons. This remark applies especially to the thickened, scaly patches—perhaps as large as a pea or bean—that are common on the face, ears, or hands in middle age and beyond. The scales are white or brownish and come off—only to return again. Then there are hard, brown warty patches on the face that crumble when picked off—only to reappear. These conditions may be readily removed by freezing with carbonic acid snow before they become cancerous. Irritation about the nose, lips, tongue, and angles of eyes should receive particular attention because these are favorite sites of cancer. All sores and ulcers must be treated to prevent them from becoming chronic, and then a possible source of cancer. Cancer of the skin occurs more often on the face and head, in elderly men on the site of skin defects. Cancer of the lip is most frequent, and begins in men over forty on the under lip as a thickening or warty growth at the margin of skin and mucous membrane. This usually is produced by a straight, short-stemmed pipe, as more likely to be hot. The little pea-sized wart or thickening of the lip becomes raw and then scabs over, but

does not heal permanently. After three or more months lumps or enlarged glands form under the jaw, but when this happens the proper time for operation is past. The radical operation, in which all the glands in the upper part of the neck are removed before they are invaded, is rewarded by permanent cure in almost all cases, as noted above.

A small thickening or abrasion on the lower lip, persisting for some months in a man over forty, is almost sure to be cancer.

Cancer of the nose, face, eyelids, forehead, ear, back of the hand, etc., beginning in a wart, mole, scurvy, patch, or red, yellow, or pearly pimple, enlarges, crusts, and then gradually disappears, melting away into a raw ulcerated spot, which may gradually involve the surrounding skin. The ulcerated or excavated raw patch has raised, pearly borders. Its growth is slow and several years may be required for it to become of much depth or size and extend all over the face. In some cases the original wart, mole, pimple, or scurvy patch may grow into a tumor, which later breaks down and ulcerates, and in other cases it presents a number of raw projections like a cauliflower. Cancer of the tongue is quite common, and starts from the irritation of hot and cold food, an irregular and sharp tooth, or the white patch caused by excessive smoking. There is at first a crack in the tongue and soon a raw spot or ulcer with a thickened base. Almost all of the skin cancers are quite susceptible of permanent cure in the beginning by removal with the knife before the disease has permeated into the neighboring glands. Various means are used to remove cancers of the skin, as caustics, *x*-ray, radium, freezing, etc., but growths can be removed at once by the knife, and only by this measure can just the proper amount of tissue be destroyed by the directing hand of the able and experienced surgeon. But superior to this and all other cura-

tive means is the removal of the precancerous stage of cancer of the skin and the avoidance altogether of the occurrence of the naturally dreaded malignant disease. *x*-Ray and radium may cure skin cancers, but they should not be used to treat deep-seated or early growths anywhere which are curable by the knife (Mayo). Cancer cells are more readily destroyed by heat than healthy tissue cells, so that heat, by a sort of slow cooking, is now used in the treatment of cancer not curable by the knife. By this means the cancer growth may be arrested even if a permanent cure is not obtained. An electrically heated instrument is used, with the patient under ether.

Immunity to Cancer.—Gaylord found that there is immunity to cancer. That mice sometimes spontaneously recover from inoculated cancer; that these cannot again be given cancer; and that their blood confers slight curative and immune effects when it is injected into animals suffering from cancer.

There have been some recoveries from malignant tumors in man caused by the injection of cancer cells from other human patients or animals in the same way that we cure infections by the use of vaccines composed of the dead germs causing infections. One object of operating in the early stage of cancer is that then the patient's immunity is strongest. In the late stages of cancer operation may lead to rapid recurrence and death, as it seems to aggravate the disease in the absence of immunity. In cases where the cancer is of slow growth there is much natural immunity.

Some persons and families appear to naturally possess some immunity to the growth of cancer, and the opposite tendency may explain an hereditary susceptibility to cancer (much questioned). Dr. Slye has recently been able to breed families of mice in which cancer occurred in

most of the adult individuals. This is either due to inherited lessened immunity to cancer or to increased susceptibility to the effects of irritation or injuries to the tissues. There is no reason why these facts cannot be applied to the human being, and why we are not justified in saying that cancer may be inherited, meaning, as in the case of consumption, that the tendency is inherited. Editorially, the Journal of the American Medical Association (April 17, 1915) regards Dr. Slye's work as "one of the great contributions to our knowledge of cancer." Dr. Slye draws two practical deductions: (1) The elimination of sources of irritation of the tissues in persons of high cancer ancestry; and (2) that the control of marriage, so that cancer may not be potential on both sides, ought to decrease the frequency of human cancer to a considerable degree. It has been found that after great improvement from one or two treatments of cancer with *x*-ray or radium, the growth may suddenly become much worse and may spread to various parts of the body. It is known that the power of immunity against the growth of germs and cancer in the body resides in the lymphatic system (and in the bone-marrow and spleen), and that this system is weakened by overuse of either radium or *x*-ray, hence the need of the greatest care and experience in their use.

Cancer Heredity.—The hereditary tendency to cancer is doubted by leading medical authorities. Dr. William Mayo affirms that he knows "no evidence that would lead to this belief"—*i. e.*, that cancer is hereditary. He says the tenet that some families have tissues which on chronic irritation are more apt to develop cancer is purely problematic, and also notes the fact that the occurrence of cancer in several members of a family is not strange considering its frequency. He quotes the enormous statistics of Hoffman, statistician of the Prudential Insurance Co. of America,

who finds not the slightest evidence "to warrant the belief that cancer is in any sense hereditary."

Taylor summarizes the influence of heredity in cancer as follows: (1) That in most instances heredity exerts no influence in cancer. (2) That there may possibly be an exception in some families. (3) That some precancerous conditions, as warts and birthmarks, may be hereditary. The most striking example of a "cancer family" is that of Napoleon. He himself, his father, two sisters, and one brother died of cancer.

Cancer heredity is, then, doubtful and is not by any means an ascertained fact.

Cancer is not contagious. Among the thousands of cancers operated upon daily throughout the world not an instance has occurred of cancer following from the many accidental cuts and pricks sustained by surgeons in their work. Other infections are frequently transmitted in this way. Contact of husband and wife, even when the sexual organs are involved by cancer, does not produce cancer in the healthy party.

When cancer does occur in husband and wife, as is not uncommon, it is only coincidence, such as would be expected from the frequency of the disease.

To indicate the enormous extent of malignant disease in this country the statistics show that there are 80,000 deaths from cancer in the United States annually, including 25,000 deaths from cancer of the stomach and 18,000 deaths from cancer of the breast. Also that the rate of mortality from cancer is increasing 2.5 per cent. per annum (Hoffman).

But if one heeds the preliminary stage of cancer, which we have endeavored to impress upon the reader in this chapter, the predisposing causes of irritation may be removed in most cases before cancer results.

Even when the patient goes to the surgeon for the first time in the early period of genuine cancer the curative results of operation are wonderfully better than those ordinarily obtained in cancer in the various stages in which it is treated today. Thus, Dr. Bloodgood, the distinguished surgeon of Johns Hopkins, and the leading authority on cancer in this country, offers the following encouraging statement: "From what we know of the early signs of cancer and the local growth in the early stages of cancer, or what precedes cancer, we should draw the greatest encouragement as to the probability of the percentage of cures possible in these early stages by good surgery. In the breast it should be at its worst 86 per cent., in local cancers of the skin over 98 per cent., in the lip and tongue over 90 per cent., in the bone over 75 per cent. With the accumulating experience of each succeeding year with such early cases, the percentage of cures increases."

CHAPTER IX

THE PREVENTION OF SEXUAL DISEASES AND SEXUAL HYGIENE

INTRODUCTORY NOTE

In the realm of preventive medicine no more vital subject can be considered than that which stands at the head of this chapter. It is vital partly because of its fundamental relation to human society and race betterment, and partly because until recently the whole discussion of reproduction and the sex life has been distorted by misconceptions, befogged by ignorance, and veiled by mysticism.

The medical profession will welcome the author's scientific and conservative presentation of this subject as representing a message from their profession to the public.

The laity will welcome the chapter as presenting much desired and highly prized information expressed in clear and concise language, authoritative and reliable.

The author is especially to be commended for the stress which he lays on the care and instruction of children by their parents, with a view of controlling physical conditions and of implanting at an early age wholesome ideas and high ideals.

WINFIELD SCOTT HALL.

This is a tremendous subject, but the discussion herein will be chiefly confined to protection of the individual rather than the public. There are but two important sexual diseases—gonorrhea and syphilis. The prevalence of these diseases is much greater than most persons realize. Authorities have estimated that 8 out of every 10 men in New York have had gonorrhea, and that 3 out of every 5 married women have acquired the disease in some degree in consequence. It is also calculated that 75 per cent.

of all operations on the sexual organs of women, and 60 per cent. of the work done by specialists in women's diseases, and 80 per cent. of the deaths of women from inflammation of the sexual organs, result from gonorrhea. A large part of sterility in both men and women (estimated at 50 per cent.) is caused by gonorrhea. Ten per cent. of all blindness and 70 to 80 per cent. of blindness in the newborn are attributable to gonorrhea.

Gonorrhea is almost always contracted by sexual intercourse with a victim of the disease, and five to six days must intervene (more rarely three to seven days) before the first symptoms arise. These usually consist in frequent and painful urination, accompanied by a whitish discharge from the urinary passage which causes a cloudiness of the urine first passed.

The disease may run a few weeks with complete recovery or may become chronic and last for months, or, rarely, for years, during which time the patient may be capable of communicating it by sexual intercourse. The inflammation frequently invades various parts of the sexual and urinary tracts of the male and female, but is not by any means confined to these organs.

Gonorrhea may produce general blood-poisoning through the presence of the special germs in the blood, and these may also attack the heart or joints, with the most serious results. So-called gonorrheal rheumatism is a very frequent complication, and there are many other sequels of the disease. Husbands who have had attacks of gonorrhea may infect their wives, and if the latter become mothers, they may transmit the disease to the eyes of their newborn infants during the process of birth. This is due to direct contact of the baby's eyes with germs of gonorrhea in the birth-passages of the mother, and if this does not happen, there is no other acquired or inherited

taint in the offspring from the disease in the parents. Gonorrhea in either sex may lead to death years after its apparent cure. Thus, a male patient of the author's has recently died from the effects of a total obstruction of the urinary passage (a stricture) caused by gonorrhea acquired some forty years previous. The consequent retention of urine led to a general poisoning (uremia) of the whole system.

Syphilis, while usually contracted by sexual intercourse, is sometimes acquired in other ways, as by means of drinking cups, towels, eating utensils, brushes, combs, barbers' and surgeons' instruments, kissing, etc. Syphilis germs live only five or six hours outside the body. The disease is most often acquired between the ages of eighteen and twenty-six. Moist lesions in the mouth and sexual organs are the only means of transmission of syphilis. The disease begins on an average in from twenty to thirty days after exposure, more rarely from two weeks to three months. A sore then appears on the site of inoculation, as on the private parts, lips, etc., with enlargement of glands in the neighborhood, as in the groins when the sexual organs are involved. After six weeks the so-called secondary stage appears, with fever, sore throat, a general rash, headache, and pains in various parts of the body. Falling of the hair and white patches in the throat and mouth are often observed. This stage may last indefinitely or may appear intermittently for years.

The secondary stage may never be noticed by the patient, or complete apparent recovery may ensue, or the secondary stage may glide imperceptibly into the third or tertiary stage. There is no regular time for its incidence. In this there may be destructive changes in any organ in the body or upon any part of the skin surface. Finally, there is a fourth stage which frequently occurs one or two

decades after apparent complete recovery from syphilis (not less than eight years), and its commonest manifestation takes the form of either locomotor ataxia (syphilis of the spinal cord) or general paresis (syphilis of the brain). Medically well-treated men leading a temperate life are less susceptible to paresis and locomotor ataxia, which occurred in about 1 per cent. of 1016 syphilitics (White). Church reports (1916) that among 4000 Austrian officers, examined twenty-two years after they had acquired syphilis, some 1.5 per cent. had developed locomotor ataxia and 4.6 per cent. had developed paresis. He believes that in syphilitics who develop paresis or locomotor ataxia the syphilitic germ has become so modified in the body that it acquires a special affinity for the nervous system—as we have seen is the case in respect to germs (streptococci) which enter the blood from diseased tonsils. Syphilis is usually not communicable for more than three or four years after the beginning of the disease. Syphilis is transmitted from mother to offspring. In fact, it is the only disease known to be so transmitted in full virulence, although it is not probably inherited by the third generation. Syphilis is said to be the cause of 40 per cent. of miscarriages and of many still-births, while 60 per cent. of the living children die at an early age. When they live they are usually stunted and defective. The mortality, as a whole, in hereditary syphilis is about 75 per cent. It appears more often three to four weeks after birth, and very rarely later than six months, but cases as late as the twentieth year are recorded. Children are often born absolutely healthy of syphilitic parents. The disease is always acquired from the mother, never from the father. After five years has elapsed since the mother has acquired syphilis there is little danger of its being communicated to her offspring, but

during relapses this may occur for eight or ten years. In such a case she may have healthy alternating with syphilitic children. If a pregnant woman has active syphilis and is treated vigorously early in the disease, especially if the infection occurs after the seventh month of pregnancy, the chances of the child being healthy are much greater. The mothers of syphilitic children frequently appear perfectly healthy because syphilis is often mild in women, and antibodies are formed in the infected child in the mother's womb which protect the mother. Syphilis has been a disease often impossible of diagnosis because it remains latent for years in persons of apparent robust health, only to break out anew without sign or warning. The modern tests for syphilis (Wassermann and Noguchi) are very accurate, but until recently its incidence has been mere guesswork. Its prevalence is, indeed, fearful to contemplate. Recent results, obtained by examination of the blood by means of the Wassermann test, are as follows: In 111 children in a Boston hospital (Lucas) and in 102 children in a Chicago hospital (Churchill) one-third were found to be syphilitic. Among 100 obstetric patients in an Australian hospital (Piper) 1 in 6 patients was found to be infected with syphilis, both by the test and in most cases by other evidences of the disease. Browning has recently found that every one of 104 prostitutes and all of 109 tramps were suffering from syphilis.

In picked men (at the age when the disease is, however, most likely to be taken) the prevalence of syphilis is much lower. In the United States Army the rate has varied in different commands from 2 to 10 per cent., but in the entire army Nichols affirms that syphilis exists to the extent of over 5 per cent., or one case in every 20 men. Vedder[1]

[1] Prevalence of Syphilis in the Army, Surg.-Gen. Bull. No. 8, June, 1915.

however, found that syphilis was prevalent to the extent of about 17 per cent. in picked recruits for the army, after 83 per cent. of the number applying had been rejected for various reasons, including a recent history of syphilis. Syphilis shortens life about four to five years on the average; in 25,000 insurance risks life was shortened five and one-half years. Syphilis is five times more common in men than women. It is prevalent to the extent of about 10 per cent. in men in foreign cities and in from 5 to 10 per cent. in American cities. There are 1,200,000 adult syphilitics in the United States (Pusey). The "golden period" for the treatment of syphilis is during the few weeks after the appearance of the sore on the sexual organs and before the beginning of the secondary symptoms, and before the germs have become buried in the tissues all over the system. With modern treatment the disease may be wholly and permanently cured by killing every syphilitic germ in the body within a few weeks at this period in place of requiring several years by the older methods.

In the tertiary period syphilis can never be cured, in the sense of killing all the syphilitic germs in the body. The symptoms may often be wholly relieved, but the germs are too deeply embedded in the tissues to be reached by drugs circulating in the blood.

Proper treatment in the early secondary stage will result in 99 per cent. of permanent cures. By the older methods about 90 per cent. of cases of syphilis were cured in dispensary practice and 97 per cent. in the best private practice, the rest going on into the tertiary stage.

Prevention of Sexual Diseases.—The vast amount of controversy concerning the pros and cons of the segregation, legalization, and medical supervision of prostitutes has resulted in a consensus of opinion of authorities opposed

to this as a means of preventing immorality, sexual disease, and crime.

Our task is to consider the means of preventing sexual disease in the individual. I believe that the problem is largely a matter of proper training, education, right living, and thinking; that the means employed to prevent sexual disease are identical with those most beneficial in promoting the general health of body and mind in the individual. It is folly to ignore the fact that the sexual desires are the most powerful of any in the world. Self-control is necessary to combat them, and for this purpose both body and mind must be at their highest point of health. On the other hand, it is right to pray, "Lead us not into temptation but deliver us from evil." This means the avoidance of all agencies which both improperly stimulate the sexual desires and weaken the will. It also means the acquisition of habits which strengthen the body and will and divert the interests and activities to other and healthier pursuits. The reasons for refraining from immoral practices are too self-evident to need more than a brief reference to them. Morals are synonymous with customs, and customs are usages found most beneficial for the individual and race. Immorality then leads to shame and deception consequent upon consorting with immoral women. It involves the chance of causing illegitimate pregnancy in the woman and the danger of acquiring one or both of the dreaded sexual diseases. It is the means of degrading a woman who might be a wife. It is likely to lead to postponement of lawful marriage and to be a source of lasting regret after marriage to a chaste partner. It lowers the whole moral tone through association with depravity and the attendant vices of vulgarity, profanity, and the use of alcohol, cocain, morphin, etc.

While escaping temptation is not so glorious or helpful

as overcoming it, yet there is sure to be enough in store. A healthy existence with plenty of outdoor sport and exercise with companions of the same sex conduces to normal sexual life. Co-education of youth in high schools of both sexes is to be condemned as favoring sexual evils, and teachers as well as doctors will almost universally endorse this opinion. The fashion of allowing great freedom of intercourse between the youth of both sexes is, in the mind of the author, wholly bad. One sees boys and girls sprawling about together in hammocks and in partial undress on beaches without let or hindrance from parents of the highest social standing. Sexual desire is one of the strongest, if not the strongest, emotion which actuates the human being, and is beyond the control of society, however much people may prate. Close intimacy between the opposite sexes should not be tolerated before the beginning of adult life. It is well known by the informed that the sexual act, from a physiologic standpoint, strictly begins with the first thought, word, look, or touch relating to a desired one. And while the persons concerned may be wholly innocent or, rather, ignorant, "yet very easily may stimulation pass from one state to the next, the next, and the next, until the great sexual act is complete, and a babe lies nestled at its mother's breast." In this, as in many other matters, it is well to regard the poet's warning, "Oh, small beginnings ye are great," and avoid them. This, again, means the avoidance of prurient books and plays and, above all else, bad companions. Hard work and play are essential to the healthy body. Idleness here, as always, is the devil's most effective tool.

Constant association with the opposite sex, especially among engaged persons to whom custom allows unusual intimacy and caresses, often results in great physical injury when continued for a long time. This follows because con-

tinual stimulation of the sexual organs, without nature's mode of relief in sexual intercourse permitted by marriage, causes local congestion and inflammation of the sexual organs in both sexes. Distressing symptoms arise, and the normal functions are enfeebled so that the sufferer may become unfitted for marriage when the time comes for it to occur. Moreover, the frequent sexual excitement engendered by such unnatural intimacy without proper physiologic relief produces a state of nervous exhaustion or prostration with its host of accompanying evils, and the afflicted person is wholly unfitted for the joys or duties of life and becomes an abomination to himself (or herself) and friends alike. Short engagements and early marriages are desirable (the latter especially as preventing sexual disease) when they may take place without privation. Long engagements should be shunned unless the parties to the contract are separated by distance. The present social state of the world does not favor early marriages because the position demanded by society may not be attained without a long course of training or years spent in trade.

A recent writer has marshalled statistics to prove that the partners of early marriages in the middle classes have a much higher death-rate than their friends who marry later, owing to the excessive struggle required to retain their place among social equals.

The use of alcohol among young men is especially conducive to sexual immorality, since it not only excites the sexual desire, but has an equally paralyzing influence over the will power. This is universally recognized—the shedding of modesty, reserve, and self-control under the action of alcohol—as evidenced by the old saying, "in vino veritas."

Among all other influences alcohol and persuasively bad companions head the list in favoring sexual immorality.

The sexual organs are stimulated by highly spiced or peppered food, by an overabundance of meat or eggs, and sleeping on soft beds with an overwarm covering.

Conversely, the daily morning cold bath and the use of a moderately hard bed with light coverings are to be recommended. The first and chief aid to the young man should be the thought that he will marry, and that the sort of woman he wants will demand that he be as chaste as herself. Keeping this always before him—living the proper life, full of work and play, and knowing the danger to morals and health from being unchaste—he will serenely pursue his way, exerting self-control to the utmost when temptation arises.

Supposing a young man has already fallen from grace owing to infection with one of the sexual diseases, is it safe for him to marry without endangering the health of wife and possible offspring? In such a case no man should marry without a careful medical examination by a specialist in genito-urinary diseases, and only recently (1913) a similar test was requested by statute in Wisconsin and has been upheld by the Supreme Court of the state (1914). After proper treatment, and the lapse of two years from the appearance of the last manifestation of syphilis, a man may safely marry, according to Osler. This advice should also include several negative Wassermann tests taken at intervals during the first three years. Hoffman's rule is often followed concerning marriage of syphilitic men; that is, if men have been thoroughly treated, and have had no symptoms for two years, they may marry from three to five years after the onset of syphilis. The Wassermann test is unimportant in this connection after five years, for of a large number of men having healthy children five years after the beginning of syphilis 50 per cent. showed a positive Wassermann test. Within the first three

years a positive Wassermann test should mean postponement of marriage. So that five years after the beginning of syphilis, in a man who has been well treated medically and free from symptoms for two years, marriage may be sanctioned despite the existence of a positive Wassermann test (Pusey).

In the case of a person who has had gonorrhea a careful microscopic examination of any discharge which exists (or may be made to appear by massage of the deeper parts of the urinary tract, and the drinking of a considerable amount of beer) may be necessary to determine the presence of the special germ and the danger of contagion. Then the new test (complement-fixation) is of great value in discovering chronic and apparently cured cases of gonorrhea. By proper treatment the male patient can usually be permanently cured within a few weeks or months.

To avoid direct exposure to possible infection with syphilis one should refrain from use of a common towel, hair-brush, comb, soap, drinking cup, and barber's implements (more particularly the razor). During the past few years preventive measures have been used in the treatment of males who have been exposed to the perils of sexual intercourse in order to avert infection with either gonorrhea or syphilis. Objection may be raised to this on the ground that rendering illegitimate intercourse free from nature's punishment will only encourage its greater prevalence. While such reasoning may to some extent be borne out by the facts, yet the risk to innocent wives and babes unborn and to other sufferers from accidental infection is paramount and will justify all such measures which will reduce the prevalence of the sexual diseases. In the case of newborn infants it is the rule that drops of a 2 per cent. solution of silver nitrate or a 20 per cent. solution of argyrol should always be instilled into their eyes a few moments

after birth, to prevent the possibility of gonorrheal infection and consequent loss of sight.

The same drugs will in most cases prevent the disease in men if dropped into the urinary passage within a few hours after sexual intercourse.

Metchnikoff, in experiments on monkeys, found that protection against infection with syphilis could be secured in most cases by the application of ointment containing 30 per cent. of calomel. A young medical student, Paul Maisonneuve, allowed himself to be inoculated from two virulently infected patients, and then calomel ointment was applied one hour later, with no development of syphilis, while a monkey succumbed from the same infection without treatment. Treatment must be applied within eighteen hours, and the sooner the better. In the United States Army and Navy these methods have been enforced during the past few years with most successful results. The principle is laid down that no man has a right to deprive the government of his services and to become a burden besides through sickness. Therefore every exposed soldier or sailor returning to garrison or ship is required to report for preventive treatment.

This consists, first, in thorough washing of the sexual organs with soap and water, dropping into the urinary passage a medicine-dropperful of a freshly prepared 20 per cent. solution of argyrol, and squeezing the end of the passage to keep the solution in for five minutes; and, finally, rubbing a salve, composed of benzoinated lard containing 30 per cent. of calomel, thoroughly over the whole surface of the sexual organs. Neither of these drugs produce any discomfort. As argyrol solution does not keep, it may be freshly made by dissolving 12 grains of argyrol (which keeps indefinitely in powder in a stoppered bottle) in a teaspoonful of cold water. In the United States Army and

Navy the man who develops sexual disease without reporting his exposure and receiving preventive treatment is punished. The results of this treatment are as follows: Major Howard reports but 1 case of syphilis in 3800 exposures, and that the yearly ratio of sexual diseases had been cut from 227 to 18 per 1000. That the preventive measures are not generally so successful on the average in the whole army (in 1913) is shown by the report that the rate of sexual diseases per 1000 men has fallen from 115 to 85 (Nixon). This moderate reduction is probably due in great part to carelessness in the use of the preventive measures. But it must be borne in mind that no preventive measures will certainly preclude the possibility of an attack of one or both of the sexual diseases after exposure through sexual intercourse. And, as has been pointed out, there are numerous other reasons, besides the danger of infection with venereal diseases, why a self-respecting person should avoid the moral and social risks of illegitimate sexual intercourse. Moreover, without personal instruction from a physician in the use of the drugs described for the prevention of sexual diseases the result is likely to be a failure. Avoidance of exposure to these diseases is the chief essential in prevention of the diseases themselves. A bachelor may refrain from sexual intercourse indefinitely without harm, providing he does not subject himself to agencies which frequently excite the sexual desires. If the sexual organs are constantly stimulated under such conditions the result may be as disastrous as not infrequently occurs in engaged persons noted above.

But the real preventive measures against sexual disease should be begun by the parents at birth, and if the boy is properly taught during his first ten years, when the brain is most impressionable, his future will be in most cases

secure. If the mother or father begin during the first few years to talk naturally about the sexual organs, as one would instruct a child about the care of his teeth or other part of the body, the child will have no hesitancy in reporting any happenings of his own bearing on this matter, for there will always be older and vicious boys, girls, or adults who will try to lead him or her astray.

Self-abuse.—The chief endeavor in young children should be to prevent masturbation or self-abuse, whereby the sexual organ is so stimulated by rubbing or irritation that the child experiences the same sensations and excitement (orgasm) which occur during sexual intercourse. Any local irritation about the penis in the male will cause the child to handle the part, and so he will be more likely to acquire the bad habit. For this reason circumcision is advisable in the male in preventing the retention of secretion and urine and avoiding consequent irritation. This operation may be best done after the infant is two or three weeks old and before the monthly nurse departs. The writer believes in circumcision as a routine practice for every male child. As the foreskin is somewhat adherent in infants, many trained nurses are taught to force it back by daily attempts at withdrawal. The author does not believe in this practice, as it may have the effect of arousing desire for stimulation of the organ even at this early age. Self-abuse is not confined to children, but is often practised by monkeys and other male animals. It is not nearly so common in girls, but is, on the other hand, not rare The more exposed organs of the male probably favors irritation. Babies may bring the sexual crisis or orgasm about by rubbing the thighs together. They should be carefully watched to prevent irritation of their sexual organs by any method, and should be punished if found addicted to the habit. As soon as children are old enough they should be

told that handling, rubbing, or irritating their sexual organs is bad for them. They should also be warned not to permit any other child or person to touch their sexual organs and to report any occurrence of the kind. When they are eight or ten years old boys should be instructed as to the harm done by masturbation. As a matter of fact, in the past almost all boys have masturbated for a longer or shorter time, and have given up the practice from some inherent sense of decency and because companions have told them it would make them crazy. With the prevailing custom of education in these matters the habit should become infrequent. The harm done is that wrought by frequent stimulation of the immature nervous system, so this is the most important part of the body to suffer. Then there is no limit to the frequency of the practice, which does not obtain in sexual intercourse. When boys masturbate after reaching the age of puberty (beginning at some period between twelve and seventeen and lasting two years or so) there is a loss of the fluid (semen) secreted from this time on by the testicles, and containing the millions of microscopic sperm cells, any one of which will produce a new individual when it comes in contact with the female germ cell, egg, or ovum.

We may summarize the evil effects of self-abuse as follows: (1) The shock to the nervous system, noted above. (2) The loss of sperm cells representing such tremendous energy and incredible potentiality. (3) Lessened formation and absorption into the blood of the internal secretion of the testicle which determines and controls the development in the youth of the sexual attributes of the virile adult male (Marshall).

These consist in tremendous growth of the long bones, particularly in the thighs, which give height to the frame; in the growth of the sexual organs, and also in the appear-

ance of hair on these parts and on the face; in the change of voice, which is said to be due to lengthening of the vocal cords. All these evidences of increased nutrition are due in great part to the activity of certain glands which pour their secretions into the blood. They each have their function to perform, and if one produces a greater or less amount of secretion than normal the most serious results ensue. Thus, disturbances of the secretion of the small gland at the base of the brain (pituitary) may either be the cause of such growth that a giant is produced or, on the other hand, the subject may become very fat and the sexual organs may become undeveloped. Total removal of the thyroid gland (in the region of the Adam's apple in the neck) will cause an individual to become unrecognizable by coarsening of the features, and many other serious changes occur. Removal of the testicles and ovaries produce marked alterations in the body and character. So it is wise to impress upon the growing youth (Prof. Hall) that the secretion of the testicles must not be wasted, as it is necessary to make the body strong and athletic and to preserve the balance essential to the proper functioning of the various ductless glands.

While excessive masturbation may so break down the general health as to lead to the production of impotency, sterility, and even idiocy and insanity, these are very rare occurrences, and it is really the case that idiocy and insanity are more frequently responsible for the lack of self-control which results in such an unnatural habit. When children have acquired the habit they are apt to be thin, nervous, and peevish, and at a later period, after ten or twelve, the subject is prone to lose interest in play and become depressed and sit by himself and mope. He is sallow and loses his appetite. Parents should be on the watch for such signs and have a confidential talk with the

lad. If he confesses to the habit, the boy should be encouraged and told that if he exerts his self-control he will soon overcome it and no evil effects will ensue.

The **treatment** consists in not allowing children to sleep together and in requiring them to sleep on rather hard beds with light covering. A boy who has contracted the habit should not be permitted to lie in bed after waking nor read in bed after retiring. He should take a cold bath in the morning and, if tempted to indulge, should bathe the sexual organs in cold water. Plain diet, without an excess of meat or eggs, and an outdoor life are desirable. Horseback exercises often lead to stimulation of the sexual organs, however, owing to friction of the saddle.

Improper books, shows, and companions must be avoided. Circumcision is advisable. But the instruction of the child from the earliest year should prevent the occurrence of self-abuse, and if such has not been begun early, then it is much more difficult to talk to boys about the later dangers. At the age of puberty (twelve to seventeen) the boy should be warned by his father, or by a doctor, of the occurrence of spontaneous discharge of semen from the penis during sleep. These so-called "pollutions" are normal if they do not happen more than once or twice a week; when occurring three times or more a doctor should be consulted.

The use of a hard bed, light covering, cold water applied to the sexual organs, abstinence from alcohol, tobacco, and avoidance of such books and plays, or intimacy with the opposite sex, as might excite sexual desires, are all part of the treatment. Sleeping on the back favors loss of seminal fluid at night, and may be avoided by tying a towel about the waist with a knot in the back. At this period, also, boys should be warned against the perils of sexual intercourse which have been discussed in the earlier part of this section.

SEXUAL HYGIENE IN MARRIAGE

Both man and maid enter into wedlock with the greatest ignorance of the physiology of the sexual organs in most cases. Custom has made ignorance, masquerading as modesty, seem the only decent course in this matter, but it is a fatal mistake, as the experience of doctors soon teaches them. Just as during a long marriage engagement stimulation of the sexual organs without physiologic relief in sexual intercourse leads to nervous breakdown and local inflammations of the sexual organs, so do unnatural practices in sexual intercourse during married life produce equally unfortunate results.

Both the man and the woman should secure medical advice before marriage concerning the marital sexual relations, or, when this is not feasible, a book of this kind may serve in a measure as a poor substitute.

It will, at any rate, suggest the importance of many matters which may lead to the seeking of professional advice in difficulties. The woman should know that she will be subjected to sexual intercourse immediately after marriage, and she should not be imbued with the idea that her husband is unusually sensual or brutal in expecting this of her. On the other hand, the man should understand that as the first impressions of fear and pain may render sexual intercourse unpleasant to his wife for months or years, he should be especially considerate in this respect in the beginning of their sexual relations. Indeed, in some cases it may be wise for him to refrain from such for a day or so until mutual love and desire break down all barriers. In some women the hymen, or membranous fold which partially closes the front passage, offers so much resistance that it may be badly torn and give rise to considerable bleeding from the results of sexual intercourse. Gradual

dilation is sometimes done by physicians before marriage, but is rarely necessary.

Still this is one reason why a professional consultation may not be amiss in the case of the woman about to marry.

The wear and tear of preparation for marriage, the achieving of the trousseau, together with that of the ceremony itself and travel afterward, is but a poor beginning for married life. If to offset the exhaustion consequent to these doings indulgence in wine is added in celebrating the event, we have the most unfavorable state for the conception of a child. The honeymoon should be passed in a quiet country place, at the mountains, seaside, or on the water, among the most healthy surroundings. Travel, hotel life, and sight-seeing are only fit for the uncommonly robust at such a time.

The frequency of sexual intercourse is a matter of importance. Persons differ in their sexual power as much as in muscular strength or in any other physical quality, and it is not any more possible to lay down exact rules than it would be to state precisely the amount of food required by any individual. During the first few weeks of married life it is too much to expect any very rigid adherence to rules, but later the axiom laid down by Luther is as good as any we know. He said, "twice a week we need not fear." Repetition of the act during the night or day is inadvisable. The use of alcohol at such times leads to subsequent exhaustion, and endangers the health of a child conceived under these conditions, whether father or mother be the transgressor.

Sexual relations are forbidden by custom during menstruation, and in some religions severe penalties, even death, are attached to disobedience of this command. In animals sexual intercourse is only practised during such periods (rut, heat), and the sexual desire is often strongest

during the latter part of menstruation in women. While abstinence is the rule from a sense of delicacy and esthetic considerations, there is no evidence that physical harm to man or woman results from sexual intercourse during the "unwell" period. Sexual intercourse is permissible during pregnancy (unless there has been a tendency to miscarriages) except in the last month or two, and except during six weeks after childbirth or after a miscarriage.

Since the nervous system of the woman is disturbed during menstruation and the pregnant state the husband should make allowance for depression, peevishness, unreason, and irritability at these times, and treat his wife with unusual gentleness and consideration in consequence. Excess in the matter of sexual intercourse is at once shown by the effect upon the general health. Headache, pressure or pain in the back of the neck, exhaustion, lack of interest and energy, with mental depression, may be the immediate result. The appetite and digestion are impaired, and there may be pain in the loins and increased susceptibility to "catching cold." In women there may be a white discharge from the front passage or vagina. The cause of such symptoms should readily be recognized and corrected at the earliest moment. Women should not feel abashed at discovering themselves subjects of sexual passion, when happily married, although their upbringing has often led them to believe such feelings immodest and unladylike. This is, of course, all bosh, and a happy marriage means a happy union of the soul, mind, and body.

Overwork, anxiety, pre-occupation, poor health, and unvaried monotony of life will abolish, to a considerable extent, the natural sexual desires. Change of scene and relaxation will often restore the normal sexual functions. Absolute personal cleanliness is essential in both partners,

and offense to the senses has an immediate influence in destroying sexual desire.

We hear much now-a-days about race suicide. This is not, of course, due to any loss of vitality in the race, but is caused by artificial methods for the prevention of pregnancy.

While this is often wholly inexcusable, the condition of the woman may be such as to endanger her life were she to become pregnant, and too frequent pregnancies are exhausting and inadvisable. Financial circumstances and the health and happiness of the family may require limitation of offspring, however. The reasons for and the desirability and justification of pursuing such a course are strikingly set forth in a recent book.[1] Almost all the artificial means of preventing pregnancy are more or less unreliable or injurious to the health. The common practice on the part of the husband of withdrawing before final completion of the sexual act, so as to avoid conception, is quite likely to cause a breakdown in his wife's nervous system. The author has in mind the case of a fine, healthy, attractive young woman who became a nervous wreck from this means, because she dreaded a second child after a hard and painful delivery of the first baby.

The setting free of the ovum or egg from the woman's ovary does not always coincide with the time of menstruation. This is shown by the fact that women become pregnant when they have not been unwell for months previously, as while nursing a baby or, very rarely, after the change of life. Then the spermatozoa, or germ cells of the man, may remain alive in the tubes of the woman for three weeks after sexual intercourse.

[1] "Fewer and Better Babies or Limitation of Offspring by Prevention of Conception," W. J. Robinson, M. D., Critic and Guide Co., New York, 1915.

So that it will be seen that menstruation is not the time during which a woman is most likely to become pregnant. The flow of blood will tend to wash out the male germ cells. There is, in fact, no time when sexual relations are free from the possibility of pregnancy, either before, or after, or between or during the unwell periods. It has, however, been found by experience that conception is most apt to occur within the first eight days after the end of menstruation, and is least likely to take place between the fourteenth and twenty-first day after menstruation. To show nature's prodigality in the way of propagation possibilities it has been calculated that a man is capable of producing some 300,000,000,000 spermatozoa during his sexual life, while a young woman starts out with 30,000 potential eggs in her ovaries. When the health of the wife demands the avoidance of pregnancy a doctor should be consulted and he will then feel justified in recommending quite certain methods for its prevention.

While a woman nurses her child menstruation usually ceases and conception does not often occur. On the other hand, menstruation may begin almost any time during the milk-giving period, and then conception is as likely to occur as at any other time. Extraordinarily, conception may happen, even in the absence of menstruation, while the mother is nursing, as noted above.

Married life exerts a strong influence on disease and longevity. There are Swedish statistics which show that there are twice as many single men who die at the age of forty as married men at the same age. These figures, which deal with deaths in Sweden between 1881 and 1890, give 14.67 deaths of single men at forty as against 7.42 deaths among married men at forty per 1000; while at forty-five there were 19.07 deaths among single men, as compared with 9.22 deaths among married men per 1000. Among women

the saving in life is not so great, on account of the dangers, cares, work, and vicissitudes of married life, but there is a considerable advantage in favor of the married. Using the same statistics as above, at the childbearing age of thirty the deaths per 1000 among married women are 6.37, and among single women 6.42; while at the age of fifty the number of deaths in married women per 1000 are but 8.99, as against 12.18 among single women. The regularity of the habits of the married, the greater freedom from dissipation among married men, and the fact that, as a class, the stronger and healthier are those who marry account for the greater longevity of wedded persons.

At the age of fifty it has been computed that the married man has an expectation of five years longer life than the single male, while the married woman at the same age has an expectation of one year longer life than the spinster of the same age. Many of the accidents incidental to the childbearing period can be prevented by modern methods and will increase the longevity of the married woman accordingly. It is said, on good authority, that the pregnant wife is less subject to fatality than the non-pregnant on account of the extra care given her at this time.

CHAPTER X

THE PREVENTION OF ACUTE AND CHRONIC RHEUMATISM AND ACUTE TONSILLITIS

We have already considered in another place the far-reaching and damaging effects of tonsillitis and other localized infections in the production not only of rheumatism, but of many other serious disorders (see page 145).

In the prevention of rheumatic fever and various forms of so-called rheumatism we find the tonsils to be the chief source of these troubles. Acute rheumatism is a disease which begins suddenly with fever, sore throat, and pains in the larger joints, which, in turn, become swollen, hot, and exceedingly tender. In four-fifths of the cases of rheumatic fever tonsillitis precedes or accompanies the rheumatism. It is the duty of the tonsils to stop the entrance of germs into the blood from the throat. In their attempt to do this they themselves frequently become acutely or chronically diseased, and are, notwithstanding, often unable to check the invasion of bacteria into the system at large. In acute rheumatism the germs find their way into the blood from diseased tonsils, and not only attack the joints, but have an affinity for the valves of the heart and lungs, so that valvular disease of the heart is the most common complication of acute rheumatism, while pneumonia and pleurisy are not infrequent accompaniments. The whole train of diseases which may end in permanent disability of the heart for life, or rapid fatality from the acute attack, begins in the apparently harmless and commonplace tonsillitis. While acute rheumatism

is a well-defined and recognized special disease, the causative germ is not so well established. Recently (1914), however, it seems pretty well ascertained that it is due to a common germ, the cause of many of the most severe wound inflammations and of the most serious inflammations in many parts of the body. The injection of these germs (streptococci) from diseased tonsils into animals has experimentally produced all the symptoms of rheumatic fever, with even the heart complication; while, on the other hand, the removal of diseased tonsils in man has been followed by complete recovery of acute and chronic forms of rheumatism.

Extensive outbreaks of acute tonsillitis have of late years been traced to the action of germs (streptococci) in milk derived from cows having inflammation of the udder, or originating in the throat of men who convey the germs to milk through handling or tasting it. Thus, in Boston, in May, 1911, an epidemic began in which there were 1048 cases of what was called septic sore throat, a severe tonsillitis, in which the glands, joints, lungs (pneumonia), heart, kidneys, and other organs were also attacked by the entrance of germs from the tonsils into the general circulation. There were forty-eight deaths from these complications. In this instance the disease was traced by Professor C. E. A. Winslow to an apparently healthy employee who was a "carrier" of streptococci in his throat. It is practically impossible to avoid such occasional accidents from drinking raw milk, and the only safeguard, therefore, is the taking of cooked milk (see p. 284). Indeed, the dairy responsible for this unfortunate outbreak had been celebrated for a generation as the show dairy of New England, and employed both a sanitarian and veterinarian of the highest standing to supervise and direct the handling of the output.

The author at the present moment of writing has a patient (the keeper of a small corner grocery) under his care with tonsillitis, and on the fourth day of the disease (today) he suddenly develops acute rheumatism in his knees, ankles, and hands. Fancy the number of similar cases he might create by handling the milk he sells—if it were not in sealed bottles—and by handling other food eaten raw, as he lives in the back of his store.

Even in the midst of rheumatic fever it may be best to remove diseased tonsils if they are not acutely inflamed.

While diseased tonsils are the chief cause of acute rheumatism, in some cases other disorders of the nose, mouth, and throat in which the same germs are present (streptococci) may be also causative factors. These include abscessed teeth, inflamed gums or Riggs' disease, catarrhal inflammation in the nose or in the cavities in the face and forehead (sinuses) connected with the nasal passages, and in inflammation in the back of the nose favored by the presence of adenoid growths.

So that these conditions must be remedied. But even when the germs in these parts do not enter the blood, to produce inflammations in other parts, it is thought that their toxins or poisons are absorbed and are sufficient to account for the so-called growing pains in the limbs of children. Moreover, these poisons generated by the germs in diseased tonsils and adenoids lower the whole vitality and stunt the development in children and render them more liable to germ diseases generally.

Enlarged Tonsils and Adenoids.—In regard to tonsils and adenoid growths, it may be said that the presence of either so that they can be plainly seen and felt is evidence that they are abnormal. Enlarged tonsils may be seen by looking into the open mouth. There are two membranous

folds on each side of the mouth which separate it from the throat, and the tonsils (one on each side) are situated in the space between the folds. In the normal throat we only see these folds (pillars), but if the tonsils are enlarged and diseased they appear as rounded projections jutting out into the throat, sometimes being so large as to almost block the entrance to the throat (see Fig. 2, page 154). The amount of infection or germ growth in them can only be determined by an expert. The adenoid growths are situated at the upper part of the throat and back of the nose and are out of sight. Their presence may be discovered by the doctor when he inserts a forefinger into the mouth, and then hooks it up behind the roof of the mouth till he touches the top of the throat, which may also be regarded as the back of the nose. For, if one should pass an instrument (held horizontally) into the nostril, and so onward until it touched the back of the throat, it would reach the location of the glandular growth known as adenoids (see Fig. 3, page 155). These produce frequent colds in children and deafness and abscess in the ear by blocking up the openings of the passages which connect the deeper part of the ears with the throat.

Enlarged tonsils and adenoids are exceedingly common in children and it is not necessary to make the uncomfortable examination to determine the presence of adenoids if enlarged tonsils are seen, because the appearance of enlarged tonsils is sufficient evidence of the occurrence of adenoids, since they are practically always co-existent. The recent custom of systematic medical inspection of school children has done more than anything else to call parents' attention both to the presence and danger of diseased tonsils and adenoid growths. But it is not possible for the inspectors to discuss the specific dangers of the

condition which we attempt to do here and also in more detail in another section (see p. 153).

In respect to the prevention of rheumatic fever, it should be added that besides the removal of diseased tonsils and adenoids and the proper dental treatment of abscessed teeth and inflamed gums (Riggs' disease), together with the cure of any existing disease of the nasal passages or cavities connected with them, there are certain general measures of importance. Thus, the avoidance of chilling and occupations where one is continually wet, the wearing of clothing sufficiently warm but not so excessive as to produce sweating, and the improvement of the general health are essential. A tendency to the disease appears to be quite commonly hereditary. Indeed, in 7 out of every 10 cases there is found to be a history of the occurrence of rheumatic fever in the family of the patient. Chorea, or St. Vitus' dance, is apparently often due to the same germs infecting the nervous system as are found in the joints in acute rheumatism. In other words, it is rheumatic and frequently occurs with or follows rheumatic fever. St. Vitus' dance is shown by the presence of uncontrollable jerking of the limbs, or grimacing, and the same measures useful in preventing acute rheumatism should be employed for the purpose of averting chorea.

Chronic rheumatism is probably always due to the absorption of germs or their poisons into the blood and thence into the joints. Chronic rheumatism is thus an infection and not due to some imaginary constitutional cause. In this disease, which is given various names, such as rheumatic gout and various forms of arthritis (inflammation of joints), there is chronic swelling, pain, and disability in various joints, as in the fingers, knee, and spine, jaw, etc. The disease may begin acutely in several joints with fever, or come on gradually with increasing tender-

ness, swelling, and pain in one joint, to be followed by a similar condition in other joints at a later period.

The more common form is seen in young or middle-aged women, where the knuckle-joints of the fingers become red, swollen, tender, painful, and stiff. Chronic rheumatism or rheumatic gout has no connection whatever with gout. In all cases of chronic rheumatism the same causes are operative as in acute rheumatism, and the disease may be cured by removal of them. In addition to the infections of the mouth and throat, it is possible for infections in other parts of the body to produce the disease, as in the case of inflammations of the sexual organs in men or women. Then there is a possibility that chronic constipation or, as the fashion dictates, auto-intoxication may lead to chronic joint troubles by absorption of germs or their poisons from the stagnant intestinal contents.

The moral is, in all cases of acute or chronic joint inflammations to prosecute a most thorough search throughout the body for some focus of local infection. These are more commonly in the mouth and throat, as we have seen. Prevention consists, then, in seeing to it individually that one has a normal mouth (teeth and gums), throat, and nose, that one may not only escape rheumatic troubles, but the host of serious diseases in remote parts of the body which may in time result from apparently insignificant local causes of discomfort (see page 145).

There are other chronic joint inflammations which come on in the course of special germ diseases and are due to the joints becoming attacked by the specific organism. Thus there may be such complications in influenza, gonorrhea, syphilis, tuberculosis, etc., and the name of the disease is applied to the disordered joint, as gonorrheal, syphilitic, tuberculous arthritis, etc. All joint inflammations are infections except those due to injury or gout. Some are

due to unknown infection, and receive names according to the changes in the joints, but popularly are classed under the name of rheumatism; others are so unquestionably but a part of a general germ disease that they receive the name of the special causative organism.

Muscular Rheumatism.—This is a condition about which we know very little; that is, we are ignorant of its pathology or the morbid changes which occur in the muscle, leading to sudden pain, stiffness, and perhaps tenderness on pressure. Almost every one is personally familiar with the discomforts of stiff neck and lumbago. Young persons are more subject to the former and the middle aged to the latter. A person may awake and be suddenly seized with the most agonizing pain on moving the neck, or it may come on at any time after exposure to cold, as after getting out of a cold bath. So, on lifting a heavy body the middle-aged man finds he can hardly straighten up, or after indulging in some sport which he pursued when younger he has to take to his bed from pain in the muscles most concerned. To prevent the disorder one should keep in training by regular daily exercise, as one attack seems to favor a recurrence of the trouble. Muscular rheumatism is common in the gouty, who should restrict the amount of food, eat meat sparingly and never more than once daily, and drink plenty of water (see page 42). The avoidance of exposure to cold and damp and of sitting in drafts when warm are most essential.

There is no connection between muscular rheumatism and rheumatic fever or the various forms of joint inflammation we have considered above, which masquerade under the generic cloak of ignorance known as chronic rheumatism. To prevent severe forms of muscular rheumatism one should at once resort to rest and heat on the

first warning pain in the muscle. Lying down with the hot-water bag in stiff neck and lumbago, and strapping of the small of the back with surgeon's adhesive plaster, by limiting the action of the muscles, secure the most rest and comfort. Moving the bowels with two or three compound cathartic pills and taking a few 10-grain capsules of aspirin, followed by a whole glass of water, at two-hour intervals, may cut short an acute attack of muscular rheumatism, whether it be in the neck, back, or chest. Strapping the chest with plaster gives the most rest and relief in muscular rheumatism in this region when breathing and movements are painful.

Muscular Cramps.—Cramps in the calves of the legs are common at night after retiring. These are caused by some form of poisoning. Either by the poisons generated in the muscles from overfatigue, or those due to various diseases, as diabetes, gout, and chronic Bright's disease. Such poisons as lead, arsenic, and alcohol will also cause muscular cramps. Bandaging the legs before going to bed will often prevent attacks when they are due to overexertion, but when this cause may be ruled out, the patient should seek professional advice lest he be a sufferer from one of the constitutional conditions noted.

ACUTE TONSILLITIS

This is a contagious disease, and should be treated as such, although it has hitherto not been included among the diseases reportable to the health authorities. It attacks young persons most frequently and all patients should be isolated. Contagion is probably only acquired by direct contact with the patient, as by kissing; or from the secretions of the nose and throat, as by use of a common drinking or eating utensil, towel, etc. Therefore

the handkerchiefs should be boiled or, better, the secretion from the mouth or nose should be collected on paper and immediately burned. The eating and drinking utensils should be boiled. Tonsillitis is a dangerous disease on account of its frequent complications, as enlarged glands, pneumonia, valvular disease of the heart, acute Bright's disease of the kidneys, inflamed joints, etc. (see page 145). For this reason one cannot teach the public too often or emphatically that it is to be avoided by all means. Because patients apparently more often escape the dangers is

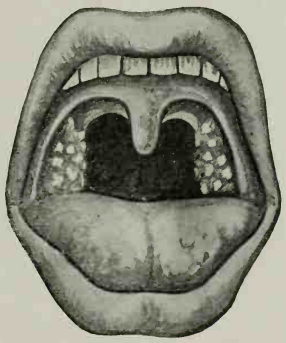


Fig. 5.—Acute follicular tonsillitis (Gleason).

no reason for making light of them, especially as many of the complications occur so long after the attacks of tonsillitis that they are not attributed to their true cause (see page 148). There is the most peculiar danger in tonsillitis and sore throat in dairy employees, as the causative germ grows and multiplies most favorably in milk, so that such patients have not infrequently been the cause of outbreaks of hundreds of cases of septic sore throat by infecting the milk they handled (see page 204).

The dairy employee with sore throat should be immediately removed from work and the local health au-

thority notified, to protect both the employer (from damages) and the public.

The most useful measure to avoid acute tonsillitis consists in painting the tonsils two or three times with a strong (10 to 20 per cent.) solution of silver nitrate during the first day at the first suggestion of sore throat. In the very first stages this may abort an attack, but later it may do harm by shutting in the infection through the coating caused by the silver. This treatment should be applied by a physician; but persons subject to acute tonsillitis are also the victims of chronic tonsillitis, and the consequences of this condition are both dangerous and far reaching (see page 153). To avert these, and recurrences of acute attacks, the total removal of the tonsils is commonly the only proper remedy.

We cannot repeat too often that the removal of the tonsils should be surgically complete. The tonsil clumsily removed in part is often more dangerous to the owner than the tonsil uncared for.

CHAPTER XI

THE PREVENTION OF DISEASES OF CHILDREN

While the surest way to achieve longevity is to possess long-lived progenitors, yet much may be done to secure a useful, healthy, and long life by the care given the child. What has already been accomplished, as affecting the average duration of life among civilized nations and in diminishing the death-rate in the case of certain diseases within a comparatively short space of time, is most remarkable. The infant mortality has had most to do with statistics concerning the general death-rates. If a considerable part of the population die within the first year of life, the statistical average duration of life will be tremendously and misleadingly altered. In computing averages it is notorious that extremes have most effect. The reduction in infant mortality is chiefly due to improvement in the milk supply of artificially fed infants, so that the diarrheal diseases, or so-called summer complaint and cholera morbus, are in great part extinguished.

Thus, in Rochester, N. Y., to give a single instance, largely through the efforts of the efficient Health Officer, Dr. G. W. Goler, the infant mortality has been reduced as follows through the supplying of clean milk for infant food: In the decade including the years 1887 to 1896, before the milk work was done, the average mortality in infants under one year in the month of July was 1010; in 1897 to 1906, after the milk work was under way, the average death-rate in babies was only 413 in July under the same general conditions.

The fight against tuberculosis has been so successful that, while it has been authoritatively estimated that the death-rate from this disease amounted to one-fourth of the whole population in Europe during the last century, at the present time it causes but one-tenth of all deaths in the most enlightened communities. The annual mortality from all causes in London in the 17th century was 50 per 1000, as against 15 at present; in Boston, in 1700, the death-rate was 34 and now is 19; and within a century London, Berlin, and Munich have cut their death-rates in half. Sweden, with its school gymnastics and government-installed hygiene, has the longevity record of the world; the average life duration of men in Sweden is fifty and of women fifty-three; in the United States it is forty-four for men and forty-six for women; while in India the average length of life for men is twenty-three and for women twenty-four years (Price Collier). Seattle has the lowest death-rate in the United States (8.37 per 1000), owing to the climate, young population, pure water and pure air (clean streets, frequent rain), and pure milk supply. The absence of slums and excellence of the health department in controlling the milk supply and infectious diseases also contribute to the causes which give Seattle its unique position.

The earlier we can begin with the work of preventive medicine, the more satisfactory will be our results. I believe that there are certain particular preventive measures which apply to the generality of children and which all parents should know. These I propose to consider here, but not necessarily in any great detail. To begin with the first weeks of the child's life:

The **operation of circumcision** for all males is desirable. I quote here from one of our leading specialists in children's diseases, Dr. Kerley: "Should circumcision be practised

as a routine measure? There is not the slightest doubt that it would be for the best interest of every male infant if he were circumcised. The operation during the second week is a trivial matter. In 1 out of every 5 male infants circumcision is a necessity, both for comfort and health. In marked degrees of phimosis (narrow or pin-hole opening in the sheath) it is the only means of relief." How many parents there are who begin by shirking this simple method of prevention of disease. This matter we have already discussed under another head (see page 193) and it is unnecessary to amplify it in this place.

Proper Food for the Infant.—The business of a proper food supply is the subject of most consequence in the case of the newborn infant. Of course, if the mother can furnish this the child is infinitely better off. In some of the older foundling asylums the mortality of newborn infants was 90 per cent., owing to our former ignorance in artificial feeding and to the generally inferior physique of foundlings.

In this place it may not be uninteresting to present some statistics concerning infant mortality and its causes.

In the United States census of 1900 the death-rate for every 1000 infants born was highest in Charleston, S. C., being 419.5; while in Washington it was 274.5; in Baltimore, 235.1; in New York, 189.4. According to the 1910 census for every 1000 babies born, there were deaths under one year of age as follows: Seattle led all the country with but 79; Rochester, N. Y., came next, with 86 deaths; while in the larger cities the deaths rose to 217 in Boston, and a still greater number in the largest cities.

Again, figuring the deaths in infants under one year of age to every 1000 of population according to the 1910 census, we have the following results: Seattle shows its leadership once more with 1.66 deaths, and these increase

in number until we reach the larger cities, as Boston with 3.34 deaths; New York with 3.67, and Baltimore with 3.84 deaths.

Russia has the highest infant mortality, and fully half the infants die during the first year of life in many districts. In Germany about one-fifth of the infants die during their first year. About one-half of the deaths in infants under one year of age are due to diarrheal diseases, and these are chiefly caused by germ-laden cows' milk. Among babies who die, about 90 per cent. are fed with cows' milk and 10 per cent. are fed from their mothers' breasts, according to Charles Harrington's German statistics.

It has been abundantly proved that the importance of having cows' milk comparatively free from germs greatly transcends the matter of its chemical identity with mothers' milk.

When the author first began his milk work in Seattle, some ten years ago, the mortality of babies under one year of age per 1000 births was very nearly 120, as compared to 66 in 1913. Owing to the production of certified milk by several farms, and to the popular interest in clean milk aroused by our writings and labors, and later to most excellent work of the former Health Officer (Dr. Crichton), and of the present Health Commissioner (Dr. McBride), the general quality of the milk supply has so improved that Seattle leads the country in this respect, and has taken several first prizes for certified and market milk at the National Dairy Shows. One advantage we have consists in the cool weather in summer, and this is not only directly more favorable to infant health, but prevents the growth of germs in milk which is not properly cooled and kept cool. Still, the reduction of the infant mortality by one-half in a decade may be attributed chiefly to the improvement in the milk-supply alone, as the climate has naturally re-

mained the same, and no other new factors of importance have obtained.

The remarkable showing of Rochester, N. Y., in her pioneer work is all the more creditable, since that city has to contend with much hotter weather than Seattle ever has.

The means by which one can secure a pure milk supply have been described in another section (see page 284). The method of artificial feeding of babies with cows' milk by "modified" milk has been most popular in the United States. This aims at so altering the chemical composition of cows' milk that it will, chemically, closely resemble human milk.

In a general way this result is accomplished by diluting the upper part of milk (top-milk or cream), after standing in bottles, with water or barley-water. Since cows' milk contains less sugar, about the same amount of fat, and much more casein or curd than human milk, by diluting a rich cow's milk with water we may obtain the right percentage of fat and at the same time reduce the normal quantity of casein, so that it will coincide with that natural to human milk. In this process the sugar is diluted, and this loss is made good by the addition of milk-sugar to the mixture. The various methods of feeding babies will not concern us in this book, but, besides all professional advice which can be obtained, it is well for all mothers to possess a good book devoted to the care of babies, among which Holt's is the accepted classical work.

The United States Public Health Service is endeavoring to promulgate through its publications a much simpler method of feeding babies than with modified milk. Skimmed milk should be fed only during the first week of life. At the beginning of the second week one part whole milk and two parts skimmed milk are given. After the end of the second week one will use half whole milk and half skimmed milk,

while during the fourth week a mixture of three parts whole milk and one part skimmed milk is given. Beginning with the second month, whole milk is fed, but this should not contain over 3 per cent. of fat. Cities require that milk shall contain more than this amount of fat, although some Holstein cows give milk containing less. One must find out from one's milkman or city authorities what is the fat content of the milk to be used, and then take some of it off to leave a milk containing only 3 per cent. of fat.

Thus, from a quart of milk, after standing four hours, which contains 4 per cent. of fat, remove the upper $1\frac{2}{3}$ ounces (4 tablespoonfuls); from a quart of milk containing 4.5 per cent. of fat, remove the upper 5 tablespoonfuls; and from milk containing 5 per cent. of fat, remove the upper seven tablespoonfuls, to get a 3 per cent. milk. The amount of milk which is fed daily should be equal to one-seventh of the weight of the baby up to three months of age; one-eighth of the weight, from three to six months; and after that from one-ninth to one-tenth of the infant's weight. Thus, for a month old baby who weighs 9 pounds, or 144 ounces, one would use one-seventh of this, or 20 ounces divided into eight feedings, given in the twenty-four hours. Each feeding consists of $2\frac{1}{2}$ ounces supplied at intervals of two and one-half hours, although more milk may be given at a feeding if the baby demands it. This arrangement permits of a nap of at least four hours in the night, and it may be extended to seven hours—from 10 P. M. to 5 A. M.—by training, in which case the amount in each bottle may be increased so as to give 20 ounces in the twenty-four hours.

During the first three months the milk should be boiled by filling the milk bottles for twenty-four hours' use, stoppering them with absorbent cotton, standing them in boiling water to their necks, and boiling them for three-

quarters of an hour. Then the bottles are to be taken out, cooled in cold water, and kept on ice. After the third month the milk should be pasteurized as described on page 287. Boiling the milk makes it more digestible by preventing the formation of tough curds in the child's stomach.[1]

This method of feeding babies from birth with boiled skimmed milk and then with gradually increasing amounts of whole milk, until at the beginning of the second month of life whole milk containing 3 per cent. of fat is given exclusively, has been extensively used abroad and has been found by the writer suitable in most healthy babies. It has the merit of great simplicity compared with the modifications more commonly employed, such as the additions of varying amounts of cream, milk-sugar or malt sugar, barley-water, water, and lime-water, the proportions of the different ingredients requiring constant changing from time to time. Recent researches have shown that it is not the large amount of curd or casein in cows' milk which is difficult of digestion for babies, as formerly held, but, on the contrary, it is the fat of cows' milk which usually disagrees and gives rise to apparent curds (in reality, soap) in the bowel discharges. This discovery removes the original scientific basis of modified milk, although many of the modern modifications produce a result very similar to the whole milk containing 3 per cent. of fat. But it must be distinctly understood that no one dilution or modification of cows' milk will agree with all infants, and in many cases the most careful study of the expert is required to arrive at the particular combination of the chief ingredients of milk which will best suit a baby with delicate digestion.

[1] Two teaspoonfuls of freshly prepared orange juice should be given the baby twice a day about an hour before the milk feeding (see pages 220, 221, 303).

The great desideratum, however, is that the milk be clean—as free from germs as possible. Even if one uses a milk which does not agree with the baby, so that it is fretful, does not gain, vomits, or is constipated and has abnormal bowel discharges with curds, etc., there is little danger, providing one can secure professional advice as to altering the food. It is merely a case of malassimilation or indigestion.

Whereas, if the milk contains many germs, especially those found in manure in dirty milk from the bowels of the cow, the baby may be poisoned beyond all help or, at any rate, is likely to be in a fight for its life lasting for weeks. Such were the cases of summer diarrhea and cholera infantum which carried off the babies to the extent of fully one-half their number during the first year in former days—simply cases of milk poisoning—and now a thing of the past owing to production of clean milk and pasteurization. The older teaching of the profession that pasteurized milk causes scurvy, rickets, anemia, and malnutrition in children is not true when orange-juice is used. Dr. North has probably tried the largest single experiment in the world in feeding 10,000 babies on pasteurized milk. The change from raw to pasteurized milk was made in a day, and no digestive disturbances, malnutrition, scurvy, or rickets occurred from the change, although the infants were never put back on raw milk.

With the use of fresh orange-juice daily during the first year, and the addition of cereals and other food after the sixth to ninth month, there appears to be no harm possible from using pasteurized milk, and no other is given to the millions of babies brought up on the continent of Europe. The modern pasteurization, at the low temperature of 145° F. for thirty minutes, while destroying all disease germs, has

been held by leading authorities not to in any way alter the chemical or vital qualities of milk. Very recently (1915), however, Dr. A. F. Hess has indubitably shown that a mild form of scurvy occurs in many infants fed exclusively on pasteurized milk (heated to 145° F. for thirty minutes) without orange-juice. This is more apt to occur when boiled or condensed milk is fed. Orange-juice will always prevent scurvy from heated milk. On the other hand, the dangers from raw cows' milk, even the product of the most sanitary stables of millionaires and of dairies run like well-conducted operating-rooms, cannot be certainly avoided, either those originating in the cow or in the human employee (see page 204).

The food should be adapted to each individual child by an expert and his advice should be sought whenever possible.

Perhaps the method of feeding infants best adapted for universal use by the average baby is that devised by Drs. Holt and Shaw and supported by the authority of the American Medical Association.[1] Whole cows' milk is diluted with water because its fat and curd (or proteins) are not so readily digested by babies as the same ingredients of human milk. Also because cows' milk contains more than double the percentage of proteins found in human milk. Sugar is added because it is a normal ingredient of milk. Cows' milk contains less than human milk and when cows' milk is diluted there is all the more need for adding sugar.

Milk-sugar or malt sugar should be used for most babies.

[1] "Save the Babies," prepared for use in Baby Health Conferences for the Committee on Public Health Education Among Women, by Drs. L. Emmett Holt and Henry L. K. Shaw. Council on Health and Public Instruction, American Medical Association.

Ordinary sugar agrees with some infants, but accustoms them to an oversweet food. Lime-water is used because it prevents the formation of too hard a curd in the infant's stomach or, in other words, makes the cows' milk more digestible.

Beginning on the third day, the average baby should be given 3 ounces of milk daily, diluted with 7 ounces of water. To this should be added 1 tablespoonful of lime-water and 2 level teaspoonfuls of sugar. This should be given in seven feedings.

At one week the average child requires 5 ounces of milk daily, which should be diluted with 10 ounces of water. To this should be added $1\frac{1}{2}$ even tablespoonfuls of sugar and 1 ounce of lime-water. This should be given in seven feedings. The milk should be increased by $\frac{1}{2}$ ounce about every four days. The water should be increased by $\frac{1}{2}$ ounce every eight days.

At three months the average child requires 16 ounces of milk daily, which should be diluted with 16 ounces of water. To this should be added 3 tablespoonfuls of sugar and 2 ounces of lime-water. This should be given in six feedings. The milk should be increased by $\frac{1}{2}$ ounce every six days. The water should be reduced by $\frac{1}{2}$ ounce about every two weeks.

At six months the average child requires 24 ounces of milk daily, which should be diluted with 12 ounces of water. To this should be added 2 ounces of lime-water and 3 even tablespoonfuls of sugar. This should be given in five feedings. The amount of milk should be increased by $\frac{1}{2}$ ounce every week. The milk should be increased only if the child is hungry and digesting his food well. It should not be increased unless he is hungry, nor if he is suffering from indigestion, even though he seems hungry.

At nine months the average child requires 30 ounces of milk daily, which should be diluted with 10 ounces of water. To this should be added 2 even tablespoonfuls of sugar and 2 ounces of lime-water. This should be given in five feedings. The sugar added may be milk-sugar or if this cannot be obtained cane (granulated) sugar or maltose (malt sugar). At first plain water should be used to dilute the milk.

After three months, sometimes earlier, a weak barley-water may be used in the place of plain water; it is made of $\frac{1}{2}$ level tablespoonful of barley flour to 16 ounces of water and cooked for twenty minutes.

At six months the barley flour may be increased to $1\frac{1}{2}$ even tablespoonfuls cooked in 12 ounces of water.

At nine months the barley flour may be increased to 3 level tablespoonfuls cooked in 8 ounces of water. The milk mixture should be pasteurized from the start and 1 to 2 tablespoonfuls of orange-juice be given daily (see page 219).

System in the bringing up of children is of as great importance as in any other business of life. There is a proper time for everything—a time for nursing or feeding, a time for sleeping (at midday and at night), a time for bathing, a time for movement of the bowels, and a time for playing. If regularity is observed in enforcing the business of these times it will be of great service in the development, growth, and health of the child, and the mother will have much more time for her other affairs. The necessity for the isolation of children, especially from other young persons, at times of sickness has been noted elsewhere. This is particularly desirable when the sick child has fever (as shown by a thermometer) and symptoms of a cold or stomach trouble, as many of the contagious diseases begin in this way.

Only recently some 90 cases of measles were reported by a state health officer as having originated from one man who went about with, as he called it, a bad cold, apparently visiting every one he knew and complaining of his misfortune, instead of staying at home in bed with measles. The diet in infants should always be reduced in the case of any acute disease. In breast-fed babies this is accomplished by giving the child 4 to 6 tablespoonfuls of barley-water in a bottle before each nursing. In bottle-fed babies it is a good rule to add an equal quantity of water to the ordinary milk mixture given at the time. There are no fevers in children which are not benefited by sponging of the whole body with tepid water when the temperature is high or over 102.5° F. The use of a well-lighted, ventilated, and simply furnished room is desirable for children with fevers.

If a child does not develop satisfactorily, is pale, under weight, and delicate, especially if he keeps his mouth open during play and sleep, one should immediately suspect the presence of enlarged tonsils and adenoids. We have described their appearance and method of detection in another place (see page 153).

At the risk of repetition, it may not be amiss to again emphasize the great importance of their removal because of the probability of the irreparable damage which they may do the body. There is no local trouble which is at the same time so common and has the possibility of leading to such wide-spread disaster. Enlarged glands in the neck practically always are induced by diseased tonsils and adenoids, and the glands are found to be tuberculous in most cases if they persist for many months. They, in turn, are often the forerunners of general tuberculosis or consumption.

Goiter is often brought on by infection through a diseased tonsil.

Colds in the head are favored by adenoid growths, and if these are severe, deafness commonly follows and often abscess of the ear, which may result in abscess in the bone of the skull behind the ear (mastoid abscess), with possible complications of brain abscess, permanent disease of the ear, facial paralysis, and all sorts of fearful possibilities.

Children who take influenza, diphtheria, measles, and scarlet fever will be much more likely to have mild attacks and will be freer from complications if they are without adenoids or disease of the tonsils.

The presence of adenoids and diseased tonsils in a child is the most frequent cause of permanent valvular disease of the heart, of rheumatic fever, chorea, or St. Vitus' dance, night terrors, and other nervous disorders. Disorders of the kidneys and lungs, as Bright's disease and pleurisy, are directly caused by diseased tonsils, so that it is the unquestionable duty of parents to have enlarged and diseased tonsils and adenoid growths removed in early childhood, and removed in their entirety, and not, as has been the custom until recently, by cutting off the tops of the tonsils and leaving the stumps covered by a scar, so imprisoning the germs that they are a greater menace to the body than before. It is, therefore, necessary that an expert do this simple operation, the results of which may be of such extraordinary value to the patient. School inspection is now the chief means of emphasizing the necessity of this operation upon parents, since diseased tonsils and adenoids produce dulness and backwardness in pupils, besides giving them a stupid expression through alteration in the shape of the jaws, face, and chest (see page 153). Another duty of the parents is the care of the teeth, since here again it has recently been discovered that the presence of germs in decayed teeth may produce as wide-spread

disease as occurs in the case of diseased tonsils. The same germs may be present, and being absorbed into the blood will produce the same effects in distant organs.

The straightening of the teeth will often greatly improve the appearance of the face by widening the jaw, and at the same time increase the assimilation of food by giving a better grinding surface, in making the teeth of the two jaws meet. Then, in widening the upper jaw by correcting irregularities in the growth of the second teeth, one prevents the occurrence of a high, narrow palate which leads to obstructed nasal breathing or, in other words, favors mouth-breathing (see pages 20, 153).

Vaccination.—The baby should be vaccinated against small-pox in the early months of life. The younger the child, the less severe is the vaccination, providing the subject is over one month old. We have discussed the matter more fully in another place (see page 77). Then the question of sexual hygiene begins with the birth of the child, and constant attention should be paid to this matter until the completion of adolescence (see page 193).

Vaccination for typhoid fever is also essential for children who live in a section in which the disease occurs or who travel about.

In many parts of the United States most of the inhabitants have typhoid fever, but there is no longer any excuse for taking this long and dangerous disease (see page 76). Again, children living in malarial regions should be given quinin regularly as a preventive during the open season, so to speak. Quinin is harmless and will avert this weakening and serious malady (see page 107). Hookworm disease, so common in many parts of the United States, may be prevented by forbidding children to go barefoot. Delicate children should be brought up as recommended for the children of nervous parents, and the same sort of care will

be indicated for the offspring of tuberculous progenitors (see page 247).

Children who have long, narrow chests and abdomens, who are thin and poorly developed, are inclined to stoop, and who have shoulder-blades jutting out behind like wings, with bellies large in proportion to the rest of the body and most prominent in the lower part—these are likely to develop indigestion and nervous troubles and should receive special care (see page 276).

Children should be taught from infancy the necessity of individual handkerchiefs, soap, towels, wash-basins, clothing, pencils, and eating and drinking utensils. Some of the most serious eye troubles, as trachoma or granular lids, are usually acquired at school from these articles used in common. Even at home, eruptive diseases, colds, tonsillitis, diphtheria, tuberculosis, etc., may be communicated by the common use of these articles. It is of the utmost importance to instil the habit of only using one's own articles during infancy, so that the child will come to only want his own things, and a habit will be formed which will endure and become second nature.

CHAPTER XII

THE PREVENTION OF DISEASES OF MIDDLE AGE

Arteriosclerosis, Heart Disease, Bright's Disease of the Kidneys

In this section I shall chiefly consider diseases of the blood-vessels, heart, and kidneys, since these are the troubles most to be feared with advancing years. By disease of the blood-vessels I refer to thickening of the arteries or, as it is called technically, arteriosclerosis.

ARTERIOSCLEROSIS

The blood-vessels are not only thickened, their caliber thus being lessened, but they degenerate (hardening) and break more readily. This process takes place naturally in old age, and is, therefore, physiologic. When arteriosclerosis occurs in youth or middle age it is abnormal and leads to many other disorders. Thus, thickening of the arteries is almost always associated with disease of the heart and kidneys, being either the cause or result of these maladies. The importance and gravity of thickening of the arteries is reflected in that trite medical maxim, "a man is as old as his blood-vessels."

The most frequent cause of thickening and hardening of the arteries is their overuse. As is the case with any other organ in the body, overuse leads to overgrowth. Thus, strain of the heart nature tries to overcome by means of its enlargement. Strain of the arteries nature attempts to remedy by increasing their thickness. By strain of the arteries is meant attempts at their overfilling, thus augmenting

the pressure from within on their walls. Overuse of the blood-vessels is commonly seen in three classes of persons: In those who customarily undergo severe physical exertion; in those frequently exposed to nervous excitement, and in those who habitually overeat. The site of the overuse of arteries is apt to be that in which the thickening of the arteries occurs. Therefore in overuse of the muscles the blood-vessels of the limbs are most thickened; in those subject to nervous excitement the vessels of the brain and heart are chiefly affected; while in those who overeat, the vessels all over the body may be thickened as well as those supplying the digestive organs.

Thickening of the vessels in one part of the body may not be nearly so serious a matter as the same trouble occurring in another part. In persons who have undergone severe manual labor it is common to see hard and thickened arteries in the limbs. The arteries may contain so much lime that they are almost bony tubes and show beautifully in *x*-ray plates. But a rupture of one of these vessels, or its partial obstruction, does not threaten life so nearly as the break of an artery of the brain (apoplexy), or the obstruction of the artery which supplies the heart with blood, when death is immediate. Both apoplexy and heart failure are the common results of arteriosclerosis in persons of middle or advanced age.

Overeating is one of the most frequent causes of arteriosclerosis in well-to-do individuals over forty. Overeating works harm in various ways. Thus, it leads to overfilling of the arteries supplying the abdominal organs, and if these become thickened and narrowed there is apt to be increased blood-pressure all over the body. This follows because the abdominal blood-vessels form a great natural reservoir, and in their normal condition can hold all the blood in the body if they are dilated. Overeating of meat is especially

injurious, since meat contains substances which tend to raise blood-pressure, and the kidneys are the organs which chiefly eliminate the end-products of meat.

The kidneys are thus overworked, and disease of the kidney is one of the most frequent causes of hardening of the arteries. Furthermore, overeating actually increases the amount of circulating blood and, therefore, the pressure or strain on the arteries. In this explanation one may see the common effects of a vicious circle. One factor begins to work harm, and in so doing sets another agency into action which aggravates the effect of the first.

The nervous causes of arteriosclerosis are of great importance. Every one is familiar with the results of mental emotion in causing changes in the blood-vessels, as shown by sudden pallor or blushing of the face. In one case the heart may be temporarily arrested and the blood-vessels of the brain underfilled (fainting); in the other example the heart may be beating violently and the arteries of the head may be overfull. In either instance there is over- or underaction of the blood-vessels and heart due to their subordination to the control of the nervous system. The frequent and continued stimulation of the nervous system, with the consequent overuse of the heart and blood-vessels, is a prolific cause of thickening of the arteries and of heart disease through the obstruction to the flow of blood in the thickened artery of the heart itself. This explains the reason for the common occurrence of such calamities as apoplexy and sudden heart failure in persons who are under constant mental excitement, expectation, hope deferred, anxiety and uncertainty dependent upon certain phases of modern life, as the endeavor to keep one's place in the world, or following a speculative business, or arduous profession, or indulging in too frequent sexual excitement (see page 187) or in other dissipations.

Nervous strain, then, means heart and vessel strain. Heart and vessel strain signify overuse of the heart and blood-vessels. This results in overactivity of the heart and overfilling of the arteries, with consequent thickening of the blood-vessels and enlargement of the heart.

Then eventuate all kinds of troubles due to insufficient and impeded blood-supply to the various organs of the body, known to physicians by the word "arteriosclerosis," and to the public chiefly by the more startling and calamitous results, as seen when a brittle, thickened blood vessel bursts in the brain with unconsciousness and paralysis (apoplexy or a stroke of paralysis), or when the heart gives out slowly or at once through failure of its degenerated muscle or obstruction in its own arteries.

Obesity puts an extra strain on the heart, as the requirements are greater in moving about and supplying with blood a heavy body.

This strain is felt particularly in the artery which supplies the heart with blood. Its consequent thickening and the impairment of the circulation leads to weakness and irregularity of the heart and the fearful heart-pains (angina pectoris) occurring in middle and advanced age. The same results may be occasioned by arteriosclerosis of the vessels of the heart from any other cause. Certain chemical substances favor the production of arteriosclerosis. The abuse of alcohol (the cause of 25 per cent. of cases of arteriosclerosis—Edwards), tobacco, tea, and coffee may be included under this head, while the poisons generated by the germs of typhoid fever, syphilis, and tuberculosis are recognized as fertile causes of arteriosclerosis in persons who have suffered from these diseases. Workers in lead and the subjects of gout and diabetes are also more liable to disease of the arteries. Chronic constipation may induce hardening of the arteries through poisons resulting from the

stagnation of the intestinal contents and their putrefaction. The presence of colon bacilli (normally inhabiting the intestines) in unusual numbers may be the cause of intestinal putrefaction, as shown by flatulence, distention, and foul-smelling bowel discharges. The treatment consists in total avoidance of meat, fish, and fowl and the substitution of a vegetable and fruit diet, reinforced by a liberal use of butter, cream, eggs, and milk.

In addition, several glasses of buttermilk should be taken daily, and any existing constipation must be overcome. High enemata once in five days are useful. If any form of local inflammation is present, as chronic appendicitis or gall-bladder trouble, it must be cured, as it affords a local nest for the breeding of the colon bacilli. Chronic intestinal putrefaction is of great importance, since the absorption of the poisons generated by the colon germs may lead not only to high blood-pressure, hardening of the arteries, but even to chronic Bright's disease of the kidneys. Heredity is a most important factor in the production of early degeneration of the blood-vessels. If one inherits poor material in the structure of the arteries, they will not stand the wear and tear attendant on the vicissitudes of a long life in this vale of tears. The more correct and cheerful view of the matter is that so characteristically put by Sir William Osler when, after stating that whole families show the tendency to early arteriosclerosis through bad material in their vessels, he adds, "more commonly the arteriosclerosis results from the bad use of good vessels."

Diseases of the kidneys, as we have already noted, is a prolific cause of thickening of the arteries and the highest blood-pressures are found in such conditions. This brings us to the relations of thickening of the arteries and kidney disease. In general arterial thickening the kidney vessels and the kidney may be involved, while in chronic

kidney trouble (Bright's disease) there is always secondary thickening of the arteries. Bright's disease is, therefore, either the cause or effect of arteriosclerosis. Bright's disease is the cause because much of the kidney tissue is obliterated and the blood-pressure must be higher than usual in order that more blood may be forced through the small amount of remaining kidney tissue, and by this means the kidneys may remove a sufficient amount of waste matter from the blood. It is nature's method of compensation, but precisely how nature accomplishes it is still a debated subject. But we do know that the arteries are thickened and weakened, and that the heart becomes enlarged in practically all cases of chronic Bright's disease of the kidneys.

It may appear strange to the layman that thickening of the arteries means weakening of them. Thickened arteries are also degenerated arteries, poor in quality, and do not supply the proper amount of blood, and are, moreover, likely to break. So the enlarged heart after a time becomes a weakened, dilated heart, or fails through lack of a proper blood-supply owing to the thickened arteries in the heart itself.

Blood-pressure is the pressure of the blood upon the arteries. The circulation may be likened to an apparatus consisting of a pump (the heart) forcing a fluid (the blood) through a system of elastic tubing (the arteries). The blood must be under a certain amount of pressure to be forced through the finer vessels (capillaries) which are of chief importance in bathing all the tissues with blood for their upbuilding and removal of waste. A constant, high blood-pressure is one of the most common causes of thickening of the arteries, as we explained in the beginning. We have also seen, as a further result, that disease of the heart and kidneys follows, the artery of the heart being

itself diseased, or the heart being strained by pumping blood through the thickened vessels. But thickening of the vessels is not always accompanied by high blood-press-

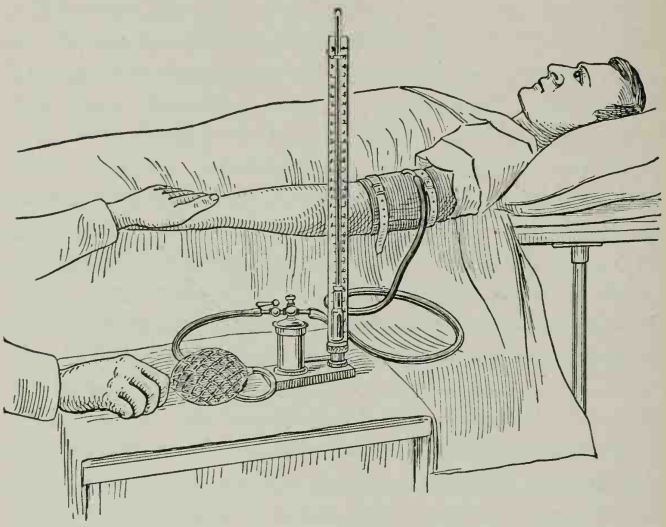


Fig. 6.—Technic of sphygmomanometry with the Stanton instrument. Blood-pressure apparatus attached to arm. On squeezing the smaller bulb the cuff about the arm is inflated and air-pressure in chamber above mercury is increased, forcing the mercury up the graduated tube. At the moment the pressure about the arm is so great as to stop pulse at the wrist the point at the upper level of the mercury is read off the tube. This indicates the amount of pressure required to shut off the pulse, which is the same above the mercury as about the arm.

ure, unless disease of the abdominal vessels is present (see above) or the kidney or heart becomes involved.

In high blood-pressure we look, therefore, for arterial, heart, or kidney disease, alone or in combination. There

are many cases, however, in which no disease of either of these organs can be detected in patients with high blood-pressure, and these may be most benefited by proper treatment. It should be added that the highest blood-pressures are seen in head injuries and disease where there is pressure on the brain.

The estimation of blood-pressure has become an important aid to diagnosis in recent years, as by its means we have an accurate method of determining the tension of the

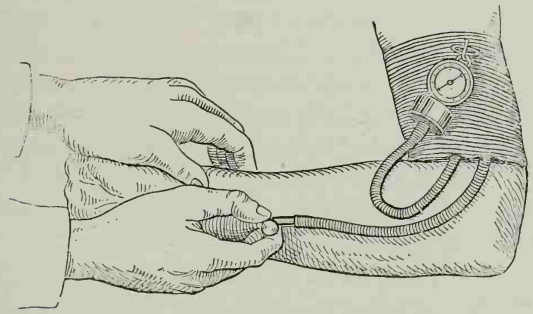


Fig. 7.—Rogers' sphygmomanometer. Another form of blood-pressure apparatus in which the air-pressure is indicated by a hand on a dial as in an aneroid barometer. More convenient but less accurate (Morrow).

artery, while the older method of guessing by feeling the pulse has been shown most ridiculously unreliable. In the popular mind the real import of blood-pressure *per se* is probably unduly exaggerated. A recent English writer on America thinks we are given to fads about our physical ailments, and states that some years ago, during a visit, everybody was talking about his or her appendix, but now it is their blood-pressure, and many persons with whom she came in contact had their own instruments and took their own blood-pressures several times a day.

Blood-pressure is actually obtained in practice by blowing up a wide, hollow, rubber cuff, which wholly encircles the arm above the elbow, until it compresses the arteries so that the pulse is obliterated in the wrist. The interior of the hollow cuff is connected either with a column of mercury or with an aneroid barometer, so that in either case the observer (with his fingers on the pulse in the wrist of the patient) notes the height of the column of mercury, or the position of the hand on the dial, at the moment that the pulse in the wrist is arrested by the pressure of the cuff on the arm. The normal blood-pressure varies between the figures 120 and 140. These are merely figures representing the height to which the column of mercury ascends (measured in millimeters), as found by practice in the use of the instrument in vast numbers of healthy individuals.

HEART DISEASE

There are four common causes of heart disease. Two of these we have just considered; that is, disease of the blood-vessels and kidneys. We have found disease of these organs commonly associated.

The most frequent cause of valvular and other diseases of the heart in young persons, and more often in young women, is acute rheumatism.

This form of heart disease follows attacks of tonsillitis and frequently rheumatic fever, and may be associated with St. Vitus' dance. All three troubles are due to infection by a special germ originating in inflammation of the tonsils, and all may be prevented by removal of the tonsils (see page 145). The fourth cause of heart disease is syphilis, the heart trouble occurring more usually in middle-aged men and seldom susceptible of cure.

The heart is weakened, dilated, and diseased (usually

temporarily) in any of the acute germ disorders, especially so by diphtheria, grip, and pneumonia.

This result follows the action of the germs, or poisons formed by the germs of these maladies. A cure is usually possible by means of absolute rest, the patient remaining flat on his back in bed until the doctor finds that it is safe for the patient to sit up. This is particularly true of old persons, and sudden deaths following grip in the aged occur simply because the patients get on their feet too soon.

Any disease causing obstruction to free circulation of blood in the lungs may produce disease of the heart from its overstrain. All the blood in the body is first pumped from the heart through the lungs, where it is supplied with oxygen, before it returns to the heart for distribution to the rest of the body. Disease, as tuberculosis, which obstructs the blood-vessels in the lungs will, of course, greatly increase the resistance in the lungs to blood forced through them by the heart.

BRIGHT'S DISEASE

Chronic inflammation of the kidneys, commonly called Bright's disease, is, as we have seen, often part and parcel of disease of the blood-vessels. In younger persons it is caused by the poisons of acute germ diseases, particularly scarlet fever, and that produced in some cases (toxemia) of pregnancy.

The same germs responsible for tonsillitis, rheumatism, and heart disease may induce disease of the kidney as well. The remedy is simple (see page 145). Some of the same chemical poisons mentioned as favoring arteriosclerosis may lead to inflammation of the kidneys. Alcohol, ether, chloroform, and other drugs are included in this group.

It is possible that poisons generated in the course of

chronic constipation may be a factor in the production of Bright's disease, as in arteriosclerosis. Exposure to cold is an exciting cause of kidney trouble because the blood leaves the surface and tends to produce congestion in the kidneys.

With the exception of special individual causes, noted in relation to disease of the heart and kidneys, the consideration of prevention of disease of the vessels, heart, and kidneys will be treated under one head, as many of the causes are common to all three diseases.

PREVENTION

It is probable that no book advice looking toward the prevention of the diseases of middle age would be so valuable as the advice to consult a physician. This sounds banal, but the author refers to a custom which should be generally established, whereby every person should receive a thorough annual physical examination, especially after the age of forty. The establishment of state health officers for the purpose of keeping people well, rather than trying to patch them up when sick, is more or less in use in Europe, and is sure to be extended as time goes on.

Some of the large life insurance companies in this country are examining their policy holders without charge at stated intervals as a matter of economy.

It is not at all uncommon for a person, conscientiously presenting himself as a good risk for life insurance examination, to find that he is the subject of Bright's disease, heart trouble, arteriosclerosis, or diabetes, much to his surprise and distress.

But knowledge of the existence of a serious disease, after the first alarm passes, is of greatest value in the early stages when much may be done to mitigate the symptoms and to prolong the life of the patient. In fact, though the

sound of Bright's disease and other well-known serious maladies strikes terror to the heart of the subject when he hears such a verdict officially announced, yet the name itself does not mean much. The outlook in any individual case depends upon many factors. It is recognized that persons with well-marked cases of Bright's disease may live for twenty years or more in comparative health, and individuals with diabetes often attain a comfortable old age if they can properly care for themselves.

Modern methods of diagnosis are so much more delicate and precise than formerly that it is possible to detect disease in its early stages long before such a diagnosis could have been made, even a few years ago. The discovery of the blood-pressure instrument, for example, has been of the greatest importance in enabling doctors to warn their patients against the dangers of arteriosclerosis and its consequent brain, heart, and kidney troubles.

The prevention of hardening of the arteries or, in other words, the attainment of old age cannot be consummated by any new or mysterious means. "A quiet, well-regulated life" is the chief desideratum.

Quiet, perhaps the most difficult of attainment, ranks of first import in the prevention of arteriosclerosis. This means abstention from hurry and worry, from anxiety and nervous tension, from overwork and overexcitement. The effects of nervous influences upon the blood-vessels and heart are shown so graphically by the blood-pressure apparatus that he who runs may read. The blood-pressure in an impressionable woman rose from 130 to 180 after receiving some bad news. It fell a like amount in the case of a criminal given a reprieve from death at the last moment. A rise of 40 is recorded in the person of a foreigner who thought he was to have his leg amputated simply because he was taken into an operating-room for removal of a

surgical dressing. A patient of the writer's, having a high blood-pressure, was taken into an operating-room to have some stitches removed after a capital operation, and became excited to such a degree that his blood-pressure was raised suddenly to the point that a blood-vessel broke in his brain. He became at once unconscious from the pressure of the blood-clot on his brain (apoplexy) and died within a few hours after having recovered from the effects of a tremendous surgical operation. It must be freely admitted that it is much easier to point out the cause than to achieve its removal. But "where there's a will there's a way" will apply to many persons.

The diet is of great importance. Moderation is the first concern in persons over forty. Eat less, and particularly less meat. Meat is largely composed of protein. This is the chief nutrient in many of the vegetable foods (especially dried peas and beans) and in fish, eggs, cheese, and milk, and it acts the same whether it be taken in any of these foods. There is probably no difference in the action of white meat or dark meat, according to the best authorities. The reasons for middle-aged persons not eating much meat are several: First, because meats are among the most palatable foods, are very rich in protein, and are apt, therefore, to be eaten too largely. Second, meats are more prone to cause intestinal putrefaction than other foods. Furthermore, there are two other bodies in meat not found in fruits or vegetables,[1] milk, cheese, or eggs, and these are the harmful so-called extractives which exist in large quantities in meat extracts and clear soup; and allied substances known as purins which are the cause of gout, and are found in greatest amount in liver, brain, kidneys, and pancreas. Both these substances favor arteriosclerosis, so that a moderate amount of meat

[1] Except in slight quantities, and as noted below.

once daily is sufficient, and when there is any marked change in the vessels or suspicion of kidney trouble, meat should be largely excluded from the diet and the protein element in food be taken in the form of milk, eggs, and vegetables (excluding dried peas and beans or soups made from them). In such cases it is best that neither fish nor eggs be taken the same day that meat is eaten, nor is it wise to eat eggs and fish both on the same day. Two or three glasses of milk daily may be drunk to advantage, and a glass of milk is equal in nourishment to two slices of bread or to two moderate-sized potatoes, or a generous helping of meat. In other words, the ideal diet for persons of middle age and past should be composed chiefly of fruits, vegetables (except dried peas and beans), cereals, eggs, and milk, with a minimum of fish or meat.

In regard to diet in arteriosclerosis, Sir William Osler says: "He will often be surprised to find that it is one-third or one-fourth of that which he has been taking (*i. e.*, 'the minimum on which he can maintain mental and bodily vigor'). He may take a cup of tea, a boiled egg, and a couple of slices of toast for breakfast; a vegetable soup and a rice pudding for luncheon; a piece of fish, a couple of vegetables, and stewed fruit for dinner, with a glass of hot milk at night or a bowl of bread and milk. With a diet along these lines an arteriosclerotic may successfully pray the prayer of Hezekiah, and get, like him, a fifteen-year extension."

It might be added that some fish are rich in purins to quite the extent that they exist in meat, notably salmon and halibut. That while most vegetables are poor in purins and some are purin-free, as cabbage, cauliflower, lettuce, etc., there are a few which contain a considerable amount, as dried peas and beans, asparagus, and onions.

Only the dried peas and beans should be excluded because of their richness in both protein and purins. Onions and asparagus both contain over 90 per cent. of water when cooked.

The quantity of liquid taken is of moment. The fad of drinking unlimited amounts of water is far from desirable in the middle aged.

An amount of fluid equal to 8 glasses or 2 quarts, including tea, coffee, milk, and water, is about the proper daily quantity. The drinking of too much water overfills the blood-vessels and so strains them and the heart. The drinking of too little fluid is harmful in that there is an insufficient amount to dilute the material eliminated by the kidneys and formation of stone in the kidney may result. The skin should be kept active by daily warm baths taken for five minutes at a temperature of 96° to 100° F. Hot baths are too depressing. Warm baths may be taken before retiring. They favor sleep and at this time are less likely to render the skin susceptible to cold and the subject to colds.

Cold baths put a good deal of strain on the heart and contract the blood-vessels, while warm baths tend to dilate the blood-vessels and reduce blood-pressure. In persons with high blood-pressure warm baths should be taken twice daily. The avoidance of constipation is necessary and this may be secured as advised in another place (see page 260). Straining during movement of the bowels may raise the blood-pressure from 140 to 180, and apoplexy is not uncommon at such times. Then we have noted the fact that poisons derived from delayed putrefactive intestinal contents may favor hardening of the arteries.

Sufficient sleep is important, since rest is the best cure for arterial strain. The warm bath and a warm glass of milk at bedtime may aid in this respect. A hot bath will

favor insomnia because it is apt to lead to increase in the blood-supply of the brain. The application of a cold sponge or cloth to the head may be useful in persons taking even a warm bath before retiring. In elderly individuals who have a habit of waking early in the morning a nap during the day is advisable.

Moderate exercise is desirable, as in walking and golfing. Severe exercise, such as required by tennis and swimming, etc., are undesirable in putting altogether too much strain on the arteries and heart.

Swimming in cold water is particularly dangerous on account of the temperature contracting the blood-vessels on the surface and the strenuous exertion, both necessitating very considerable strain on the vessels and heart.

Alcohol, tea, coffee, and tobacco are all injurious in those suffering from arteriosclerosis. Whether these amenities should be absolutely abstained from depends largely on the individual temperament and will. If their extremely moderate use, as a single cup of tea or coffee or a single cigar daily, cannot be enjoyed without the danger of exceeding these limits, the only sensible course is to abjure them altogether. The avoidance of chilling the body is essential, as this leads to marked changes in the circulation and strain of the blood-vessels. An even, comparatively warm, dry climate is most conducive to health, and persons living by necessity in a cold climate should take a vacation when possible during the colder months and visit a warmer country. The wearing of wool underclothing is advisable, and some forms are made which do not cause irritation of the skin, which has led many persons to discard their use.

Finally, it may be said that while one should escape the wear and tear of life as much as possible to avert the effects of the vessel changes, yet it is unwise to give up active work and interest in pursuits not necessarily involving

great responsibility, anxiety, worry, or excitement. The surest way to attain a rapid and genuine old age is to "retire," in the popular meaning of the word. The leaders in our country today, as Charles W. Eliot and Thomas A. Edison, are the grand old men who never retire except from the more arduous duties of life.

There are other common diseases that threaten those in middle or advanced life which either cannot be appropriately considered in a work of this kind or which have been discussed in other parts of the book.

Among the latter may be included cancer (see page 160) and prostatic enlargement, so prevalent among old men. The end-results of arteriosclerosis—apoplexy, heart failure, and Bright's disease—are avoided to a considerable extent by following the course advised in this chapter. Pneumonia is one of the most frequent causes of death in old people. One who has lived in towns composed largely of elderly people, and such are not by any means infrequent in New England, will be impressed with the great toll which pneumonia exacts in the later winter months, especially February and March. It is probable that the enforced confinement to the house (with battened double windows) for a long period is the cause of the lessened resistance to the germ of pneumonia, and also the want of free ventilation permits the accumulation of the germs in dwelling rooms, as pneumonia germs are very common inhabitants of the nose and throat in healthy persons and in those with head colds. When possible an annual migration to a warm climate, where an outdoor life may be indulged in, will be the best means of prolonging life.

It seems probable that all the causes of heart, blood-vessel, and kidney disease are but predisposing, except germs; and we shall find ultimately that the lodgment of germs (circulating in the blood) in these organs is the direct

cause of their disease. Metchnikoff long ago affirmed that the changes in the arteries from old age were due to germ growth, and recently Rosenow has found Bright's disease of the kidneys and valvular heart disease to be due to direct infection with germs from the tonsil, abscessed teeth, or other infections.

CHAPTER XIII

THE PREVENTION OF NERVOUS AND MENTAL DISEASES

INTRODUCTORY NOTE

This chapter on the prevention of nervous and mental diseases seems to embody in concise and terse form the chief points that need emphasis in a discussion of such matters before a popular audience. It is admirably written and the details as to the management of the nervous child are practical and sensible.

I like particularly the stress laid upon the sexual life, and upon alcohol and syphilis in relation to preventive nervous disorders.

It is true that from the standpoint of surgery correct diagnosis and operation may often relieve what appear to be neurasthenic or hysteric symptoms; on the other hand, the tendency seems to me to be to rely too much on surgical procedures, and many operations are unfortunately performed which are found to have been unnecessary.

There are many mental causes of nervous disorders, and the physician needs to keep this in view, as well as all possible physical features.

FREDERICK PETERSON.

Neurasthenia, Hysteria, Paresis, Dementia Præcox, Paranoia, Mania, Melancholia

Under this caption we have in mind chiefly the prevention of functional nervous disorders, especially neurasthenia or nervous prostration and hysteria, together with some of the more common forms of mental disorder. Unfortunately, a defective nervous system is more certainly inherited than any other bodily abnormality. To begin preventive treatment in the case of the offspring of

neurasthenic, neurotic, or "nervous" parents one should begin some generations back to secure the best results. But the outlook is by no means hopeless, or even precarious, if the children can be reared in a way to counteract their probable inherited weakness. If only one parent is neurasthenic, the chances of nervous weakness in the progeny is correspondingly less, and if the neurasthenia in the parent is acquired and has been cured or improved, the likelihood of any inherited weakness in the offspring is much less than if the parent had inherited the taint.

Neurasthenia.—In neurasthenia there is a loss of nervous force and control. Persons with a tendency to the trouble have only a small nervous capital, and when it is heavily drawn upon, through emotional or physical strain of any kind, they become nervous bankrupts.

Some nationalities are conspicuously subject to neurasthenia, and these are the Americans, Hebrews, Slavs, Poles, and Russians. It is seen commonly in immigrants in large cities, living in unhygienic surroundings and pressed for the necessities of life under strange social and economic conditions. The physical and mental strain is too great for their already impoverished physiques. In former times the unfit perished, but now, owing to a more (and too?) humane environment, many of the unfit survive.

The more common causes of acquired nervous breakdown are included in sexual agencies; constant mental and physical strain, care, and worry; poisons, as alcohol, morphin, tobacco; and those generated by germs in typhoid fever, malaria, influenza, and syphilis. So illustrious and sane an authority as Sir William Osler states that sexual factors are of "the first importance" in the production of the so-called neuroses or functional nervous disorders. Some authors pass them over as being but unimportant

factors among a host of causes, but the writer has been strongly impressed with the sexual origin of a large proportion of cases of nervous prostration. Crile's theory of nervous shock, which is largely accepted today, postulates the disturbing action of stimuli on the brain which cannot be transformed into action even when the subject is unconscious, as during a surgical operation under ether. He finds that constant mental strain, or anxiety, or excessive muscular activity lead to actual microscopic changes in the brain, liver, and other glands which result in nervous exhaustion. He finds that when the stimulus to the brain can result in normal activity, as when an animal is hurt and escapes, the harm does not occur, but when the stimuli may not be turned into the normal paths of expression, then damage ensues. Thus, stimulation of the sexual organs lead to nervous impulses which must be constantly repressed under civilized conditions, but the result may be grave injury to the nervous system. The only remedy is to avoid undue sexual stimulation until such a time as the sexual functions are normally active and productive in marriage. Sexual excitement in marriage engagements results so commonly in neurasthenia that this form has been given a special name. The emotions are not so commonly and strongly influenced by any other agency as by the sexual passions. To quote Osler again: "Cherchez la femme is a safe rule in investigating a neurotic case." The reader is referred to the section on Sexual Hygiene for more detailed consideration of this subject.

The treatment for the prevention of nervous disorders in the susceptible offspring of neurotic (pertaining to the nerves) parents should begin at birth, but as it is just the sort of treatment that is most beneficial for any child, there is every reason for enforcing it.

The infant should have proper discipline from the

start, and not be fondled, held, or nursed every time it shows restlessness or cries. As the mother is often neurotic, it is important to have a kind, matter-of-fact, firm nurse who is not given to sentimental, romantic, or religious tendencies. Children should be reared in the country if possible. The matters of proper food at regular hours, abundance of sleep, fresh air, and daily bathing are of importance.

Avoidance of all means to indulge or literally "spoil" the child is, of course, essential. When the child becomes sulky or stormy because his wants are not supplied, it is wise to ignore him for a time and show such apparent sorrow at his behavior that the child will himself repent and then be in a suitable mood to receive proper correction. The sense of duty, obedience, unselfishness, self-denial, and responsibility should be inculcated at an early age. Any tendency to brood over fancied slights inflicted by others should be combated emphatically. Association with other children in school and play is essential, more particularly in the case of the "only child." Competitive games, walking, riding, swimming, rowing, tennis, bicycling (with companions) are all desirable.

Games requiring fierce competition in the presence of audiences are, however, very undesirable in leading to great mental and physical strain. School should not be begun before the seventh year, and it is a great question what sort of school is best. The public schools are good in their democracy and competition, but represent a low standard; the private schools give more individual attention and are on a higher level, while the small private school or tutor afford the greatest amount of individual attention to the pupil and represent the highest standard of instruction. Preparatory schools in the country offer by far the best environment for youth in question, in affording compe-

tition, a high standard of instruction, and a large degree of individual attention from the masters in the matter of teaching, morals, manners, physical training, and sports. Discipline, self-confidence, modesty, a sense of responsibility, good manners, health, and character are obtained at such schools as Rugby, Eton, and Harrow, in England, and at Groton, St. Mark's, St. Paul, Exeter, etc., in the United States. Being situated in the country, the pupils are not subjected to the unhealthy attractions of the city, and give their time to study and sport outdoors, and receive a much more wholesome diet and training than at home. Our state universities are mostly located in country towns, and offer to a considerable degree the same environment as the large private preparatory schools, but the co-educational feature is extremely objectionable. It is during the period of puberty (twelve to seventeen) that special instruction should be given both boys and girls concerning their developing sexual functions (see pages 193, 202) to avoid the formation of false ideas and bad habits. At most of the best preparatory schools the pupils have such instruction given in the proper manner by a physician.

That school should be selected which subordinates book knowledge to the moral and physical training, and this is the tendency of the great English public schools.

The choosing of the proper kind of a career is of moment. It should be one as free as may be from unusual strain and worry and, preferably, not largely sedentary. Relaxation in regular outdoor sport is essential; also eight to ten hours' sleep. Indulgence in alcohol is particularly undesirable in nervous persons, because there is an unusual longing for it at times to supply temporary strength in bridging over a period of strain.

The temptation to repeat the remedy is too great to allow of its use. Excess in coffee, tea, or tobacco are es-

pecially prejudicial to the nerves. The same may be said of sexual excess. The long engagement is to be tabooed, and a simple wedding and wholesome honeymoon in the country (and not a tiresome journey) are indicated (see page 197). In the case of the woman, rest, quiet, and freedom from anxiety are peculiarly necessary during menstruation, pregnancy, and following childbirth. Early consultation with a physician in suspected pregnancy will often give relief and a feeling of security. Prevention of neurasthenia in the adult is usually only attempted after an attack has been experienced. Treatment of local troubles will often relieve the general neurasthenia, and in no cases is a thorough physical examination from head to foot more essential to discover a local trouble masquerading as nervous prostration.

Nervous prostration, to those who have never experienced it, often seems an inexcusable and incomprehensible mental state which could be prevented by exercise of will power and common sense. It is as real a condition as a toothache to the patient, and his will power is so weakened that trying to exert it is much like trying to lift himself by his own boot-straps.

There is loss of self-reliance, and little everyday tasks and responsibilities become overwhelming burdens. The patient neglects his business, procrastinates, and often shuns society. The nervous system has no resistance and is peculiarly susceptible to every influence or irritation. Women are often emotional, cry and throw themselves about, and have suicidal ideas. There is usually mental depression. A feeling of pressure or constriction in the back of the head or neck, and sometimes in other parts of the head, is the most common symptom. The patient easily tires and sometimes is so exhausted as to be unable to walk. Special fears are characteristic, as fear of being

alone, of being in a crowd or open place, of being in the cars, of lightning, etc. The memory is poor. Sleeplessness is the rule. Pains may occur in almost any organ and part of the body and simulate organic disease, and this is why a thorough physical examination is required to surely determine that the neurasthenia is not secondary to some local trouble. Correction of local sources of irritation, as stated above, may wholly cure neurasthenia, especially if it is of the acquired and not of the inherited variety. Local disease of the sexual organs in man is a most frequent cause, as has been already noted and emphasized. Since abdominal surgery has made the diagnosis of abdominal troubles often possible in diseases formerly subject to guesswork, it has been found that many of the so-called cases of nervous dyspepsia were, in reality, due to ulcer of the stomach, chronic appendicitis, etc. On the other hand, many persons with neurasthenia have been subjected to much surgery for suppositious organic diseases which never existed except in the mind of more or less ignorant or mercenary operators. The leading surgeons are always on their guard against falling into such errors.

The prevention of neurasthenia means practically proper living. Cabot regards four elements as essential to proper living, and has recently written a book ("What Men Live By") in which he amplifies his ideas on the practical application of these—work, play, love, and worship. All are necessary in proper proportion for preserving the normal moral, mental, and physical state we denote as "mens sana in corpore sano," a healthy mind in a healthy body. The older methods of treatment of neurasthenia included largely the Weir-Mitchell rest cure, in which the patient remained in bed for three to six weeks in a sanatorium away from home, in the hands of a doctor and nurse, and was stuffed with food, given massage and electricity, and kept

away from cares and worries. This treatment no man would stand, and it is usually inadvisable except in women who are much emaciated and who suffer from malnutrition. The more modern method is that by which the patient is gradually directed into a normal manner of living by finding some sort of work which will interest him or her, so that it will not be drudgery, and combining this with a proper amount of recreation. Such treatment sounds very simple, but it requires all the tact and wisdom of an experienced physician to guide a neurasthenic person back to health, and there will be required many mental boosts from the doctor and many relapses on the part of the patient before the end is secured. This re-education is best accomplished when the patient can put himself in the hands of the physician specializing in this matter, and having all the facilities of a sanatorium in the country, with its various outdoor and indoor arrangements for work and play. Modern society is responsible for much neurasthenia, especially among women, owing to the unhealthy life which results from excitement, late hours, the use of alcohol, and lack of restful occupation. The "coming out" of the young woman is attended by so much gaiety and late hours that only the unusually strong female can stand the ordeal, and when this is combined with a prolonged round of entertainments prior to marriage and its attendant demands for extra exertion and excitement, the whole culminating in a final burst of social pyrotechnics at the wedding, we have all the ingredients for producing a beautiful case of nervous exhaustion at the worst possible time.

Insanity may be defined as the sudden or gradual development in a person of more or less permanent peculiarities in thought, feeling, and action. This definition indicates a decided change in the normal character of the person, whatever that may have been. Unfortunately, heredity is

here a more unquestionable and paramount cause than in the case of any other disease. In asylums it has been found that the history of mental trouble can be traced in the forebears of half the inmates, and it is estimated that from 50 to 70 per cent. of cases of mental trouble owe their origin to inherited mental defects. The brain development of the child is imperfect owing to the defective germ material from the parents (egg of the mother, sperm cell of the father). Observers have noted diminution in the number, together with imperfect development and irregularity, of the brain cells in mental defectives. Such conditions are also produced by the influence of alcohol on the parents at the time of conception of the child, or bad health of the mother while she is carrying the child, or diseases of the subject in childhood, such as convulsions, scarlet fever, influenza, and meningitis. The care and surroundings of the child and method of its upbringing as to diet, food, habits, work, play, diseases, schooling, and home life have naturally an important bearing in favoring or hindering the advent of mental breakdowns. If the conditions are bad they may be sufficient in themselves to cause insanity, and with an added inherited taint, would be pretty certain to do so.

Many immigrants become insane probably from their unfavorable environment alone.

Causes of Insanity.—Bad habits are the cause of about one-quarter of all cases of insanity, and these include the abuse of alcohol, morphin, cocain, and self-abuse, but the chief of these is alcohol. Alcohol, in the report of the Massachusetts Commission of 1910 on the reason for the increase of criminal and mental defectives, was found the essential cause—"Indeed it is the belief of this commission, based upon long personal observation, that the abuse of alcohol directly and indirectly does more to fill our prisons, insane

hospitals, institutions for the feeble minded, and almshouses than all other causes combined. We are unable to formulate any recommendations as to legislation which we believe would materially modify this deplorable condition. It is probable that long-continued education of the young as to the mental, moral, physical, and economic results of the abuse of alcohol will be the most effective method of dealing with the subject."

It is hard for persons living in refined and comfortable circumstances to realize the full meaning of this opinion, but if one actually sees the innumerable cases of delirium tremens which enter large city hospitals every day of the year, and follows them into the courts and thence into the asylums (those who do not stop at the morgue), its true impressiveness becomes very poignant. During holiday seasons, as about Christmas and New Years, the number of such cases is sickening and appalling.

Alcohol is the cause of 20 per cent. of all cases of insanity according to a well-known alienist.

Another fruitful but preventable cause of insanity is syphilis, which we have stated elsewhere (see page 183) is practically the sole cause of locomotor ataxia and paresis (or general paralysis of the insane, or softening of the brain). Paresis occurs in middle life and terminates in death in three to five years. About 14 per cent. of the inmates of New York State hospitals have this disease, and there are probably about 10,000 deaths in the United States annually from this cause, if the same rate prevails as in New York State. Locomotor ataxia is syphilis of the spinal cord. Paresis is syphilis of the brain.

Certain epochs are favorable for the development of insanity. In women the age of puberty (twelve to fourteen), pregnancy and childbirth, and the period of change of life (forty-five to fifty-five) are danger periods; while in

men middle life (thirty-five to fifty) is the more frequent age at which insanity appears.

Forms of Insanity.—During youth one of the commonest forms of insanity, known as *precocious dementia* (dementia præcox), begins. This is seen especially in those with hereditary tendencies to mental or nervous disease or in the progeny of alcoholic forebears. Sufferers from this form of mental impairment are long lived and accumulate in institutions, so that they comprise about 40 per cent. of the inmates. The forming of proper mental habits is to a considerable extent possible, and may avert such types of precocious mental breakdown. One must not permit worries, cares, anxieties, and desires to become obsessions by brooding over them, but use will and self-control in banishing them by directing the thoughts into other channels, by work, by interest in others, and by confessing one's troubles to a sympathetic friend which will often clear the mental atmosphere and aid in establishing mental equilibrium. Then, again, oversensitiveness to fancied slights and offense may lead in the susceptible to the actual delusions of the insane that the subject is being persecuted by imaginary persons, or the constant mental warfare with the obsessing thoughts or desires may result in perversions of the senses so that the patient hears imaginary voices or sees imaginary objects (hallucinations).

While the intellect, will, and memory are so impaired in dementia that the patient's mental condition is patent to all, yet in another less common form of insanity, *paranoia*, the subject may show no mental deterioration. These are the persons who commit crimes, while their apparent mental acuteness deceives juries, and they escape commitment to institutions for the criminal insane notwithstanding the absolute certainty as to diagnosis in the

opinion of unbiased experts. The latter are rarely called in such cases, however. One notable example is that of a paranoiac who murdered a leading professional man of this country and, constantly trying to escape incarceration for years, has recently succeeded—owing to the influence of money. In every community there are lamentable instances of miscarriage of justice in the case of criminal paranoiacs. They are frequent litigants and difficult to convict. The paranoiac imagines he is being persecuted and deprived of his property, business, or professional rights, or that some one is alienating the affections of his wife or fiancée. It is for this reason that he is dangerous and is apt to make sudden murderous assaults upon his fancied enemies. Paranoiacs are often able to attend to their business, talk quietly and well upon current topics, and thus commonly delude the casual observer. They are, however, born with a defective nervous anatomy and show faulty development and peculiarities in childhood, and though bright in school, are self-conceited, suspicious, and morbid.

Later the paranoiac discovers that he is an exalted character—of noble birth, a prophet, or Christ. In killing prominent persons the paranoiac believes himself a public benefactor. Being impressionable, paranoiacs are ready tools for anarchists and unprincipled men.

There is a large class of cases comprising the type of *manic-depressive insanity*. This is peculiarly an inheritance which curses many families. In the form of mania the patient may be noisy, restless, and violent, destroying furniture. But often in this phase he is only in an excited and pleasurable state of mind. He thinks he is rich and gives money away in an absurd fashion, talks constantly, makes friends without discrimination, and sleeps poorly. In the depressive form, or melancholia, there is the opposite

condition. Here the patient may sit motionless and brooding in gloom and despondency. He imagines he is worthless or has committed the unpardonable crime; or there may be signs of deep distress, restlessness, the subject moving back and forth and wringing his hands and moaning. The tendency to suicide is common. Sometimes periods of exaltation alternate with those of depression after an intervening period of normality (circular insanity). Victims of the manic-depressive insanity tend to recover in a variable time—from weeks to a year or so. Finally, there is the *senile dementia*, in which degenerative changes occur in the brain cells and narrowing of the blood-vessels in the brain as a part of old age.

Treatment of Insanity.—The laity have extraordinary ideas about the insane. They think that they may be argued out of delusions, depression, etc. It is useless to argue and combat imaginary fixed ideas or delusions, and may cause the patient to become violent. In a general way the insane should be treated like anybody else, so far as is compatible with safety regarding themselves and others. Individuals who show great depression should, however, be carefully watched to prevent them from committing suicide, and those laboring under the delusion that they are being persecuted or wronged should be put under restraint lest they become guilty of homicide.

The sanatorium or hospital is the only place for persons with disordered minds, as the chances of recovery are much better away from their ordinary environment, and they are thus protected from doing violence to themselves or others.

There are probably 250,000 insane people in the United States today, and, including the feeble-minded, epileptics, and mental defectives, there are some 750,000 patients afflicted with mental defects and disease who should be in institutions in this country (Mullan). A large percent-

age of these cases might be prevented if the various causes enumerated were removed and if proper living and mental and physical training were taught and practised.

There is great interest in this subject at present, and State societies for mental hygiene are being established to protect the mental health of the public, to study and spread abroad knowledge of the causes, prevention, and treatment of mental disorders, and to better the conditions of the mentally defective. We have made a similar brief attempt in the foregoing pages in reference to individual prevention of mental diseases.

CHAPTER XIV

THE PREVENTION OF DISEASES OF DIGESTION

Constipation, Ulcer, Gastritis, Gall-stones, Appendicitis, Stone in the Kidney, Nervous Indigestion, Visceroptosis

CONSTIPATION

CONSTIPATION is the most common and radical digestive disorder. It is impossible to say precisely how much harm may be accomplished by habitual constipation, but a large part of known diseases has been attributed by authorities to it. We do know positively that mental depression, physical weakness and loss of energy, headache, foul tongue, taste, and breath are often immediate results of constipation. Also that inflammation of the bowels, diarrhea, and piles result from long-continued stagnation of the bowel contents.

Many of the common abdominal diseases, as gall-stones, appendicitis, etc., are thought to originate in chronic constipation by leading medical authorities, while from constant absorption of poisons due to bacterial growth or putrefaction of delayed intestinal contents all kinds of constitutional diseases may arise. The chronic joint troubles known as chronic rheumatism or rheumatic gout, and even hardening of arteries and premature old age, are commonly believed by noted physicians to be caused by chronic constipation. It is an unfortunate fact that we are continually taking one-sided views of all sorts of matters, so that each specialist, medical or other-

wise, is apt to exaggerate his own specialty and attribute to it all possible effects, to the exclusion of all others.

In chronic constipation it is the colon or large intestine which is at fault, and the taking of buttermilk has been much in vogue, with the idea, originated by Metchnikoff, that its sour-milk germs (lactobacilli) would destroy the germs in the bowels which were thought to bring about the changes in old age. Osler thus characterizes the fad, which is now waning, as follows, "Captivated by the theories of Metchnikoff, we have been for some years on the crest of a colonic wave, and intestinal toxemia (poisoning) has been held responsible for many of the worst of the ills that flesh is heir to, more particularly arteriosclerosis and old age. The seniles and preseniles of two continents have been taking sour milk and lactobacillary compounds, to the great benefit of the manufacturing chemists. But the fad is passing, not, as I hope, to be replaced by one even more serious, in which operation is advised for every case of intestinal stasis (stagnation)."

Without going into further discussion as to the possibilities of remote harm from constipation, it seems reasonable to believe that there is no other disorder which is so generally preventable and at the same time so common and so likely to be provocative of serious local and remote diseases. By constipation is meant retention of the intestinal contents. This may be due either to infrequent action of the bowels or to insufficient action; that is, the bowels may move daily, but not sufficiently, so that material may remain for months in the intestines while a part of the contents is passing through or around that left behind. The natural action occurs owing to the contractions and secretions of the bowels.

In constipation one or both are deficient. The contractions may fail for lack of the stimulus of sufficient coarse

residue and too good digestion, or sometimes from too much residue in overeating. In many cases too little water is taken. Constipation is growing more common because of the increase of sedentary lives in cities, and because we eat too little coarse food, such as is still used by the peasantry of many countries.

The constipating foods are the digestible foods which leave little residue in the bowels. Thus, meat, fish, and eggs are notably constipating. Among other causes of constipation is failure in attending to nature's needs at a regular time each day. The school girl is too hurried or modest to make her wants known; the business man is too busy to attend to such a trifling matter as nature's most imperative requirement, he must catch a train or perform some other important act. Persons may be so interested in reading while in the closet that the bowels become insensitive.

Frequently the taking of powerful pills establishes constipation as a habit, because the intestines come to rely on unnatural stimulation.

In the milder forms of constipation simple measures may remedy the trouble. Thus, drinking a glass of hot or cold water containing a pinch of salt on rising and at bedtime, taking exercise on horseback ("the outside of a horse is the best thing for the inside of a man"), in tennis, swimming, baseball, golf, and eating stewed or raw fruit at each meal may be sufficient. Cooked fruit is more digestible, as apple-sauce, baked apples, stewed prunes. An attempt should be made at a regular hour each day, and no alarm need be felt if for two or three days there is no bowel movement after beginning treatment.

Proper diet will cure most cases of constipation. This treatment depends upon the fact that certain articles of food tend to overcome constipation in different ways.

Fruits and some vegetables contain cathartic principles, and other vegetables act chiefly because they leave a coarse residue to stimulate the bowels. Among the fruits and vegetables containing cathartic principles may be included oranges, grapefruit, apples, grapes, peaches, pears, prunes, melons, tomatoes, cucumbers, onions, beets, carrots, potatoes, and spinach; while turnips and squash, Brussel sprouts, string beans, green peas, and oyster plant stimulate the bowels by their residue. In addition, acids are laxative, so that pickles, vinegar, and acid fruits and buttermilk act through their acidity. Oils, as in salad, lubricate the contents of the bowels and are laxative, together with butter, cream, and bacon. Coarse bread containing the hulls of grain is perhaps the most effective laxative in stimulating the coats of the bowels.

If a person can eat six slices of rye, whole wheat, graham, or "brown" bread daily, that in itself is often sufficient to cure constipation.

The constipating articles of food include milk, eggs, cheese, meat, fish, tea (tannin), cocoa, chocolate, red wine, macaroni, spaghetti, etc. It is not possible to eliminate these wholly from the diet, but they should be eaten in moderation, while there should be a corresponding increase in the amount of coarse bread, fruit, and vegetables. Sweets are also laxative.

We may give a sample diet list as follows. It is not intended that a person should eat every article included under each meal, but he can vary his diet according to the dishes recommended.

On rising, a glass of cold or hot water, according to preference, containing a pinch of salt.

Breakfast

Oatmeal with syrup or cream and sugar, one or two slices of graham, rye, wheat bread, corn bread, or Boston brown bread. Cracked wheat, hominy grits, or graham meal may be used in place of oatmeal.

Fruit raw or cooked, or marmalade, or honey. Eggs with bacon or omelet with apple-sauce (which is excellent). Coffee, cream, and sugar.

Luncheon

Fish, as mackerel, salmon, halibut, herring, or sardines. One of the coarse breads, as at breakfast, or gingerbread. Two green vegetables or salad. Jam or marmalade. Fruit, as stewed apples, figs, or apricots, etc. Cider, lemonade, or weak Oolong tea with cream and sugar, or a glass or two of buttermilk.

Dinner

Thick or thin vegetable soups. Green vegetables and potatoes, fish or meat, and salad and pickles. Two slices of coarse bread. Desserts of fruit or puddings of coarse meals, as Indian meal, or fruit puddings, as apple Charlotte, brown Betty, etc.

At bedtime a glass of buttermilk, or figs, seedless raisins, or stewed prunes.

The only objection to this diet is that some persons are unable to take it because the coarse food gives them flatulence and pain and the acid fruits occasion heart-burn. Then, again, if an individual is traveling or not living at home it may be impossible for him to obtain such a diet. In these cases the patient should take a diet as near that described as he can secure or digest, and, in addition, one of the remedies which I am about to recommend. Heart-

burn from acid may be relieved by Husband's magnesia, cooking soda, or a few soda-mints.

While there is a well-founded popular prejudice against the taking of physics for habitual constipation, in the case of powerful drugs in pills, there is no reason why the active laxative principles of vegetables should be more harmful than the eating of the vegetables themselves.

This is particularly true with certain drugs which act more to tone up the muscular coat of the bowel in atonic (lack of tone) conditions than to irritate the bowels. Such drugs may be rightly looked upon in the light of intestinal tonics, and they may be used daily for years without increasing the dose, and often prove effective in smaller dose as time goes on. Such a drug is cascara sagrada, and the writer has found the aromatic fluidextract of cascara sagrada, made by Sharpe and Dohme, the most reliable preparation. The dose is half a teaspoonful to a teaspoonful taken at bedtime without water. Some persons find that a teaspoonful, more or less, of one of the common salts (Epsom, Glaubers, or artificial Carlsbad) each morning on rising in a whole glass of hot or cold water is effective.

Or one of the laxative mineral waters, as Hunyadi János, Pluto, Congress, Hathorn, Crab, Carlsbad, Apenta, Marienbad, Kissingen, Friedrichshall, Condal, Caribana, Rakoczy, etc., taken on rising in hot water, may be used.

It often happens that the effect of these salines wears away in time and one must change to another. Recently the use of agar-agar, obtained from Japanese seaweed, has become deservedly popular. It may be used daily without harm, as it passes through the bowel unchanged, but in so doing absorbs much water and swells and acts by increasing the bulk of the intestinal contents. The writer has found that a mixture of agar-agar, cut in half-inch

lengths and mixed with an equal amount of sterilized bran (sold by grocers in tight packages for laxative use), is most efficient when taken with a little salt and mixed with hot water like mush or more like a bran-mash for equine use. Two or more tablespoonfuls of each are thus eaten at bedtime or breakfast with sugar and cream. The mixture usually causes large normal, formed movements. In many persons the agar-agar alone will suffice taken in the same way. It may be bought by the pound of druggists, but the finely powdered is useless. Another serviceable and harmless remedy is paraffin oil or albolene. This is sold by druggists, flavored for internal use, under the name aromatic paraffin oil. It is practically a liquid vaselin and passes through the bowels unchanged, lubricating their contents and thus facilitating expulsion of them.

A tablespoonful, more or less, may be taken thrice daily, or a third to half a glass at night. In some persons the remedy causes griping and discomfort, but in many it forms an excellent remedy. I have found either cascara sagrada, one of the salines, or agar-agar and bran the most valuable remedies in habitual constipation.

Sulphur is useful in teaspoonful doses at night in cases of hemorrhoids or piles. Senna is a serviceable drug in chronic constipation. From ten to twenty-five leaves may be chewed at night, or two tablespoonfuls of senna leaves are stewed with three dozen prunes, the leaves being temporarily placed in a cheese-cloth bag in the stew, as it is not necessary to eat them.

The dose is ten prunes with their juice one or twice daily, and after a time the prunes may be taken alone by gradually cutting out the senna. The fig syrup given children for occasional constipation is, in reality, a preparation of senna.

Thin olive oil (grown on the hills) may be of worth in combating chronic constipation, but, like albolene, causes griping and flatulence in some individuals.

A tablespoonful should be taken thrice daily after meals, but it is wise to begin with but a teaspoonful and gradually increase the dose.

Exercise is useful in almost all cases of habitual constipation, and it not infrequently happens that persons find constipation a thing of the past during vacation while camping and exercising outdoors.

Outdoor exercise and games are always best for young persons, as baseball, tennis, swimming, and horseback riding. In middle-aged and elderly individuals golf is one of the most satisfactory exercises, since violent exertion is contraindicated. Walking, though good for the general health, is rarely effective in overcoming habitual constipation.

Gymnasium and home exercises are of advantage when outdoor exercise or games are not practical. I have taken the following exercises from Gant's work on "Constipation." They should be practised, one after the other, for fifteen to thirty minutes once daily, "and, as a rule, if persisted in they become a habit, and the exercise is looked forward to with pleasure (Bettmann)":

(1) Stand erect with the legs together, and slowly bend the upper part of the body to the left as far as possible, and then to the right in the same manner.

(2) Assume the erect posture and rotate or turn the body upon the hip.

(3) Take the same position, and, without bending the knees, slowly lean forward and downward until the tips of the fingers touch the floor in front of the toes.

(4) Lie flat upon a firm bed, table, or couch, with the legs held rigidly together, and raise the body until it is at a

right angle with the limbs. (This is accomplished more readily if the toes are held down by some object.)

(5) Reverse the procedure by raising the stiffened limbs until they are at a right angle to the body.

(6) While still in the recumbent posture bend the knees and draw the thighs closely up against the abdomen.

(7) Kneel upon the floor and, with the hips fixed, bend the body in succession forward, backward, from side to side, and then rotate as far as possible first in one direction and then in the other.

(8) Standing erect, with hands crossed behind or extended fully above the head, quickly change to the squatting posture.

(9) Lean slantingly forward and repeatedly draw up the abdominal muscles, and then relax, taking deep breaths, to exercise the diaphragm and the abdominal muscles.

(10) Extend both arms at a right angle with the body so as to form a straight horizontal line, and, with the arms in this position, walk six or eight times, on tiptoes, from one end of the room to the other.

Abdominal massage may be beneficial in some cases, but as a rule is not at all necessary, except in much weakened women, when it should be given for fifteen minutes before rising; or a cannon ball, weighing about 5 pounds, may be rolled about over the abdomen for this time. Injections of water into the rectum generally lose their effect in time and are awkward to take. The fad of injecting large amounts of water high up in the bowel does harm if persisted in for any time, as the bowels become too distended.

Constipation is more common in brunettes. It may itself be caused by many diseases in which there is general lack of tone. It is exceedingly common in anemia and may, indeed, lead to impoverishment of the blood, so we

have a vicious circle established. Then constipation may be due to faulty development of the intestines which is common in certain builds (see page 276), so that kinking and partial obstruction occurs at certain points in the course of the large intestine. For this reason no case of chronic constipation of any intensity should be allowed to continue without recourse to examination with the *x*-rays, by which means the whole course of the large bowel may be readily outlined and the rate of progress of the intestinal contents precisely estimated. In chronic constipation, in which there is almost obstruction, the patient's skin is very sallow and bronzed, he becomes greatly emaciated and suffers from weakness, headache, and digestive disturbances. In some of these cases operation will yield most remarkably favorable results.

There is a form of constipation (spasmodic) common in nervous women in which the bowel becomes contracted into a cord, and this leads to attacks of colic; the movements are ribbon-like or occur as small, hard, round pellets, and at times much mucus or slime may be passed from the bowels.

These cases require special treatment by a physician.

Constipation in Children.—The feeding of pasteurized or boiled milk to infants may lead to constipation, but unless certified milk can be fed, and in any case in hot weather, it is safer to give milk pasteurized rather than run the risks of using milk which may cause a fatal diarrhea. Constipation is infinitely preferable to diarrhea in an infant. Increasing the amount of cream in infants' milk may cure constipation, but this again is usually undesirable in babies fed on cows' milk, because an increase of fat to an extent greater than 3.5 per cent. is apt to produce digestive disturbance.

The addition of malted milk or Mellin's food (in place of

milk-sugar when it is used) to the bottled milk will often act as a sufficient laxative to combat constipation in infants; or 3 teaspoonfuls of malted milk in 4 ounces of water may be given once daily in place of a milk feeding. Then orange-juice, 2 tablespoonfuls twice daily, is generally beneficial for infants and will tend to overcome costiveness. A small piece of soap, molded in conical shape, may be introduced into the bowel at the regular time at which the movement should occur, or a glycerin suppository, made for infant's use, may be introduced once daily.

The best internal remedy for constipation is Philipps' milk of magnesia, in the dose of 1 to 2 teaspoonfuls, added to one of the bottles of milk once daily. When olive oil works satisfactorily it may be given in place of the magnesia, since it is a food as well as medicine. From $\frac{1}{4}$ to 2 teaspoonfuls of oil may be given after the bottle feeding three times daily.

It is best to begin with not more than $\frac{1}{2}$ teaspoonful.

Instead of oil, Squibb's liquid vaselin may be employed in a dose of from 2 teaspoonfuls to 2 tablespoonfuls once daily. It will be remembered that vaselin is not absorbed by the patient and is absolutely harmless, and passes through the bowels unchanged, acting simply as a lubricant. But it is by no means always effective and may cause nausea and gas, and discomfort in the bowels.

Older children running about may receive to advantage 2 or 3 teaspoonfuls of olive oil, after eating, thrice daily, and should be given orange-juice, baked apple or stewed rhubarb, prunes, or other fruit daily. Fifteen to thirty drops of the aromatic fluidextract of cascara sagrada, recommended above, may be appropriately given to children each night for chronic constipation not relieved by the additions to diet.

DIGESTIVE DISEASES

Digestive diseases are commonly divided into functional and organic. In the functional forms there are no changes in the anatomy of the stomach or intestines, whereas in the organic forms there are marked changes, as in ulcer and cancer of the stomach. Ulcer and cancer constitute the serious organic stomach troubles, but compose only about 10 per cent. of stomach diseases as a whole. The remaining nine-tenths of stomach disorders are functional. One-third of these are due to general diseases, one-third are caused by prolapse of the abdominal organs associated with inherited nervous weakness, and classified roughly as nervous dyspepsia, while the remaining stomach troubles (20 per cent. of the whole) are secondary (reflex) and the result of diseases in other parts of the abdomen, especially gall-stones and chronic appendicitis. In regard to cancer of the stomach all we can do in the way of prevention is to treat ulcer, because we know that a large percentage of cancers of the stomach (60 to 70 per cent.) are due to the chronic irritation of ulcers (Mayo clinic). On the other hand, the proportion of ulcers, considered as a whole, which eventuate in cancers is, of course, very slight.

Ulcer of the Stomach.—While ulcer should be cured to relieve patients of suffering, the danger of cancer should be an added incentive to obtain a complete cure. Only about 24 per cent. of ulcers are permanently cured by purely medical means (Joslin).

At the Mayo clinic the proportion of cures following operation for ulcer (stomach and duodenum) after two years and longer in 600 cases is reported to be 67 per cent., and 96 per cent. of the patients were benefited.

In the prevention of ulcer of the stomach we are handicapped because there is as yet no exact knowledge as to the cause of ulcer.

The probability of infection, that is, the lodging of germs in the walls of the stomach or bowel, is now commonly accepted (see page 145).

The occurrence of anemia in young women and possibly the secretion of excessive acid in the stomach have a predisposing influence. These conditions should be combated. The recent remarkable experiments of Rosenow appear to point to ulcer as being at times caused by the germs found in tonsillitis (streptococci), and therefore the removal of diseased tonsils may be the means of preventing ulcer and, indirectly, cancer of the stomach (see page 149).

Gastritis.—The only other organic disease of the stomach of importance (besides ulcer and cancer) is gastritis. Any case of chronic stomach indigestion was called gastritis when the author began his medical studies. Now we know that only the most careful examination of the stomach contents will suffice for a diagnosis, and the symptoms may be latent, so that many cases of gastritis exist without symptoms. It is far less common than formerly thought and taught, and in most cases it is secondary to other diseases, as ulcer and cancer of the stomach or diseases of the lungs, kidneys, etc.

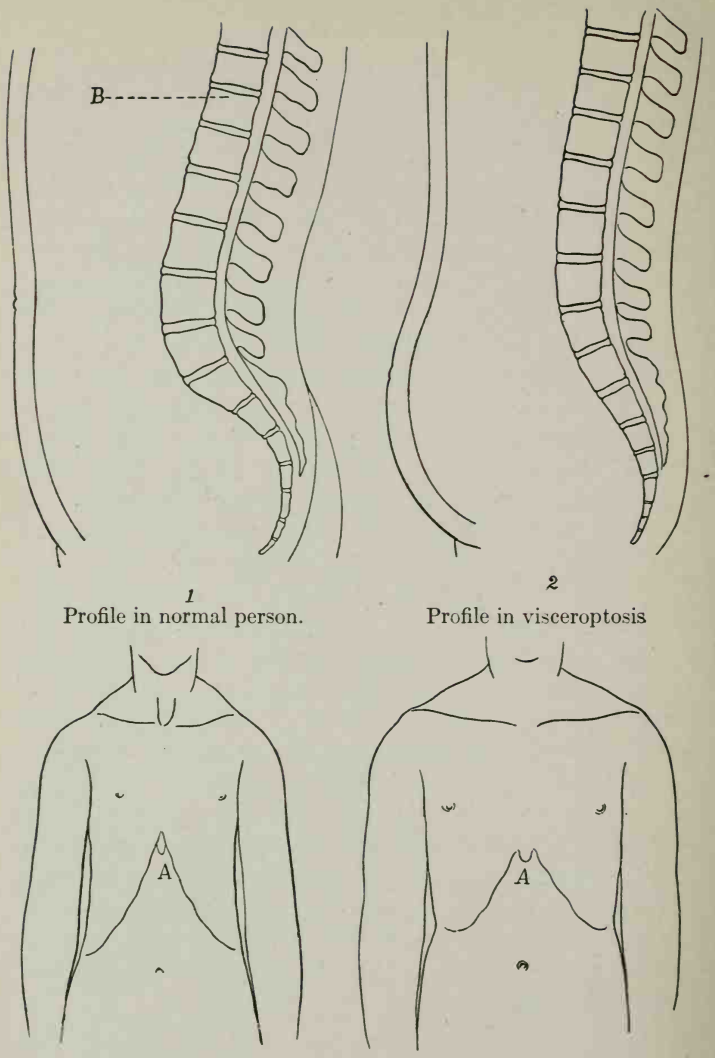
Acute gastritis with vomiting is common owing to errors in diet, the swallowing of food poisons and chemicals, as alcohol and poisons. Primary chronic gastritis is most frequently due to abuse of alcohol, tea, coffee, and chewing tobacco, the taking of large amounts of ice-water, or to overeating or the eating of indigestible food. It occurs in some persons without any apparent cause.

Gall-stones, Appendicitis, Stone in the Kidney.—So much for the organic diseases of the stomach. Now we will consider the three groups of functional indigestion. The first group, in which the stomach is upset by diseases in other parts of the abdomen, as gall-stones, chronic ap-

pendicitis, stone in the kidney, and diseases of the female sexual organs, we may dismiss in a few words because of our ignorance of the cause of some of these diseases. There is no exact knowledge pertaining to the origin of appendicitis and gall-stones. At present it appears that infections in the mouth and throat may at times be a source of these diseases (see page 145), but the causation of gall-stones and appendicitis is still a debatable question. Little positive can be yet affirmed. Being unaware of the cause of many ailments, we naturally are unable to prevent them; but as 90 per cent. of stomach troubles are caused by diseases situated outside of the stomach, it logically follows that the most careful examination of the whole body should be made in every case of chronic indigestion.

This statement is true not only because of the abdominal disorders which lead to disturbance of the stomach, but also because of the general diseases which sometimes give rise to stomach trouble as their chief symptom. The writer can think of patients coming to him for stomach trouble caused by eye-strain, by a tumor of the womb, by consumption, by Bright's disease, by stone in the kidney, by tuberculosis, peritonitis, etc., etc. Many of the stomach specialists have in the past failed to make correct diagnoses because of lack of knowledge now possessed by the abdominal surgeon, and because they relied overmuch on the findings of analysis of the stomach contents, and took too narrow a view of the matter. One skilled and broadly experienced in general medical work and who keeps in touch with the surgeon is the best physician for the diagnosis of stomach troubles.

A leading Southern surgeon tells the story of a patient with stomach trouble who went from doctor to doctor without relief, and as no organic disease was discovered, the general verdict was nervous dyspepsia. At last the patient



1
Profile in normal person.

2
Profile in visceroptosis

3
Visceroptosis.

4
Normal.

Fig. 8.

had a perfectly plain attack of appendicitis, his appendix was removed, and recovery from his digestive symptoms was expected. But before long all the old pain and trouble began, and the original diagnosis of nervous dyspepsia was again pronounced with added vigor and confidence. While going the rounds of the medical profession the patient suddenly developed symptoms of gall-stones, and these were removed by another surgeon, who thought he had at last performed a permanent cure. But in a short time the same distress again appeared, and then the doctors *knew* the patient was a "neuro" or nervous subject. The patient still persevered with the profession, not driven to quackery by his unfortunate experiences as so many are, and came to a doctor who suggested an *x*-ray picture of his kidneys. The finding of a stone in the kidney was the reward, and on its removal the patient made at last a permanent recovery. The stone was present during the whole period of the patient's illness, and a thorough and complete examination of his case had never been made, because it is so much easier to use the phrase "nervous," which throws the onus on the patient and makes him feel properly humiliated. No diagnosis of chronic stomach trouble is complete until not only a general examination of the body has been made, including that of the bowel contents, blood, urine, and expectoration (if there is any), but also until plates have been

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Fig. 8.—3 shows the long, narrow chest and abdomen and the narrow angle formed by the lower border of the ribs at *A*, the so-called costal angle; 2 shows the flat back as compared with the profile of the normal back in 1. The internal organs—large intestine, kidneys, liver—lie on this shelf at *B*, and are not so likely to prolapse as when attached to a perpendicular back, as shown in 1. In 4 is shown the normal broad chest and broad costal angle at *A*. The width of this angle alone is sufficient to exclude the presence of visceroptosis in most cases, as seen in 4 at *A*.

taken with the *x*-ray of the abdominal organs, and the movements of the stomach should be observed at the time of taking the pictures with the *x*-ray machine.

All this is essential before pronouncing the case one of "nerves."

Nervous Dyspepsia and Visceroptosis.—This brings us at last to the subject of nervous dyspepsia. All persons may be divided into two classes for this purpose. There are the normal, with broad chests and well-developed bodies (Fig. 8, 1 and 4), and the others. The second class have long narrow chests and bellies. They are thin, often stoop, and have projecting shoulder-blades.

Their bellies are large in proportion to the rest of their bodies, and instead of projecting more above the navel, the belly is more prominent below the navel. Their backs are straight below the shoulder-blades, lacking the proper curve in the "small of the back" (Fig. 8, 2).

A special diagnostic point is the fact of the narrow angle to be observed at the upper part of the belly formed by the lower border of the ribs. This is of such importance that there is an instrument made for determining the angle (Fig. 8, 3). In the normal person this angle is broad (Fig. 8, 4). In children we find frailness, lack of fat, slenderness of muscle, and lack of vigor. In the adult there is a falling downward of the abdominal organs, as the stomach, large intestine, liver, and kidney. In the child who creeps like a quadruped there is little disturbance, but when it assumes the erect posture digestive troubles begin. There are developmental defects in these patients. The attachments of the organs are long, lax or defective, the back is straight (Fig. 8, 2), and the angle or shelf normally present in the upper part of the back is absent and the organs sag directly downward. The narrow chest (*i. e.*, from side to side)

gives less room for the organs in the upper part of the belly, as the kidneys, liver, and stomach, another reason for downward displacement of these organs. Persons with these various abnormalities of build are said to have visceroptosis or, in other words, ptosis, or sagging of the abdominal organs or viscera. In this class of patients, which one can recognize (even when they are dressed) by their build and more certainly if one can observe the angle of the lower border of the ribs, functional digestive disorders are to be expected.

These are included in the group of nervous dyspepsias. There is another division of persons with visceroptosis depending upon the fact that they are of normal build, but owing to marked relaxation of the abdominal walls the organs have sagged downward and become displaced. This condition more often follows pregnancy in which there is great distention of the abdomen with stretching of the walls, followed by sudden relief from pressure and muscular flabbiness of the abdominal walls after childbirth.

After a long, debilitating disease, especially typhoid fever, the same result may occur. Faulty, stooping posture in young persons favors visceroptosis by crowding down the abdominal organs. Loss of weight removes fat about the abdominal organs and allows them to sag.

Corsets compressing the upper part of the abdomen tends to force down the organs. Constipation loads the bowel with an extra weight of contents which aids its prolapse. But in most cases the faulty development of the supports of the abdominal organs and the build of the patient are the primary causes. Indeed, the defective build and the defective nervous organization which accompanies it are frequently hereditary. About 1 in every 4 women has defects in her build and abdominal supports which lead to visceroptosis. But not all these per-

sons become patients. About 1 in every 6 patients coming to the stomach specialist is suffering from the effects of visceroptosis, and the disease is seven times more frequent in women than in men (Lockwood).

The *symptoms* do not usually appear until early adult life, when the effects of stress and strain become evident. The sagging of the abdominal organs causes kinks in them and so gives rise to constipation. The absence of general nervous and muscular vigor favors loss of tone in the stomach and the most frequent form of indigestion, *i. e.*, atonic (without tone), dyspepsia characterized by a feeling of fulness and distention in the stomach, belching of gas and heart-burn, loss of appetite, nausea, vomiting, etc.

Patients with visceroptosis exhibit another common symptom, although this may be present in any case where there is loss of tone in the stomach. If such a one lies down on his back on a bed, and the abdominal wall is suddenly pushed inward over the stomach, a splashing sound will be elicited. This may occur in any one immediately after drinking, but in persons with loss of tone in the walls of the stomach it may be heard at almost any time between meals.

But many persons with visceroptosis do not suffer from the sagging organs, and others recover from their symptoms while the state of their abdominal organs remains unchanged. So that it will be seen in any given case one cannot certainly say that the faulty position of the abdominal organs is responsible for the presence of symptoms, but that the symptoms may result from fatigue due to a weak nervous system. The same symptoms, as constipation and indigestion, may occur in persons free from visceroptosis. We can definitely affirm, however, that persons born with visceroptosis are pretty sure to be thin and nervous, and that to cure them not only must the

abdominal organs be pushed up into place, but treatment for weak nerves must also be pursued. In some patients this treatment consists in the wearing of the right kind of abdominal belt and rest in bed, accompanied by a fattening diet, which accomplishes two ends—first, the formation of fat within the abdomen, which holds the organs up in place, and, second, the rest and forced feeding, which is the best method of treating nervous weakness.

We may define visceroptosis, then, as a condition in which there are anatomic displacements of the abdominal organs combined with a tendency to nervous derangements, usually inherited, but sometimes acquired. A large proportion of such patients are subject to functional or so-called nervous indigestion.

It by no means follows that nervous indigestion is always due to visceroptosis, however, but any causes tending to lower the tone of the nervous system are capable of causing nervous dyspepsia.

Nervous dyspepsia is then brought on by physical or mental overwork, dissipation, strain of any kind, as from family troubles (sickness and death), an unhappy love affair, or business difficulties; certain debilitating diseases predisposed to nervous indigestion, as tuberculosis or anemia.

The chief difference between functional and organic diseases of the stomach lies in the fact that the patient suffers genuine pain in organic disease, whereas in functional stomach trouble there may be great discomfort from a feeling of fulness, distention, heart-burn, nausea, vomiting, belching of gas, and bringing up of acid in the throat, etc., but not real hard pain at any time. Then another important distinction, which has already been made, is that the presence of visceroptosis is itself presumptive of functional rather than organic disease, since in subjects

of this habit one expects functional dyspepsia to occur. On the other hand, of course, it does not follow that a person with visceroptosis may not have organic disease of the stomach, but the chances are that any digestive disturbance is much more likely to be functional than organic in the case of such individuals.

The *prevention* of nervous functional dyspepsia should begin in infancy in children who have inherited the tendency, as shown by the build which we have described above. In general, the same care should be given them as we have already recommended in another place for the progeny of nervous parents (see page 247). A full nourishing diet, with plenty of cream and butter and a healthy outdoor life, with sufficient rest and sleep, are especially desirable. The clothing should not hang from the outer part of the shoulder, but from straps coming over the shoulders close to the neck so as not to make the shoulders droop. The child should be taught to stand and sit erect, as in stooping the abdominal organs are pushed downward out of place. If the child cannot be made to stand erect in any other way a brace may have to be fitted by a doctor. To assume the proper position the endeavor should be made to stand as if one were attempting to be as tall as possible without raising the heels from the ground. This brings the head up and back. The common directions to "throw the shoulders back" are not sufficient, and do not cause the head to be held erect nor the stomach to be held in, as is accomplished by the other position. The drinking of large amounts of water between meals is detrimental to persons with visceroptosis in favoring sagging of the stomach. After any long, weakening illness, as typhoid fever, the patient should not be permitted to get up until his normal weight has been restored, because otherwise

the abdominal organs may prolapse from lack of the abdominal fat-padding which naturally holds them up in place.

Following childbirth it is always advisable for women to wear a proper abdominal belt, as the so-called Storm binder, in order that they may not suffer from sagging of the stomach and other abdominal organs which is so common at this time. When the disease of visceroptosis is present in an aggravated form with nervous symptoms, emaciation, and digestive disturbances, such as we have already enumerated, treatment of the patient while up and about is so unsatisfactory that no physician should attempt it. In the milder degrees of the trouble a good fitting belt may be sufficient, with rest and drinking of a pint of cream daily, but in the severe forms only a course of a month or six weeks in bed with the rest treatment in a sanatorium, followed by the use of a belt, will suffice. The question of operation will arise in cases in which there is loss of appetite, vomiting (sometimes of blood), emaciation, great apathy, persistent constipation, flatulence, muscular and joint pains, and in women, inflammation of the breasts. Surgery is generally harmful to nervous persons and visceroptosis is often relieved by the means outlined above. One of the chief reasons for resort to the surgeon is because the patient and physician have tired of each other, according to one authority. There should be very good reasons for operating, and it should be undertaken only after a consultation with conservative men and after a thorough trial of medical treatment. Operation for the cure of visceroptosis is in disrepute with most of the leading surgeons, unless there is sufficient displacement of the bowels to produce actual obstruction in them.

The cases of nervous dyspepsia which are not part of a visceroptosis are practically due to the same causes as

nervous prostration or neurasthenia. The prevention of this class of cases is described under Neurasthenia. While some of the causes may be removed, such as mental and physical overwork, dissipation, sexual abuse or excess, yet worry and strain consequent upon love affairs, family or business troubles, or poverty are often beyond our power to aid.

CHAPTER XV

FOOD POISONING

INTRODUCTORY NOTE

THERE are few fields of household hygiene, household sanitation, or household medicine in which sound popular teaching is so important as in that which relates to the sanitation of food.

Right knowledge of this subject is not only clouded by lack of information, but obstructed by definite misinformation freely dispensed by pseudosanitarians, who make this subject their happy hunting-ground. It is, therefore, a special pleasure to commend to the public so clear and so well-balanced a statement as that which follows.

Milk is very wisely placed in the forefront in discussing the dangers from food, and the author's strong recommendation of pasteurization must be heartily endorsed by all familiar with the subject. Experience in public health teaches me more and more clearly that no raw milk is a safe food and that pasteurization by the heating system (140° F. for twenty minutes) should be everywhere insisted on. This process destroys all disease germs without altering the food value of milk, except in one respect. The peculiar bodies, known as vitamins, which milk contains, are destroyed by heating, and infants fed on boiled and pasteurized milk alone may suffer from scurvy as a result. The loss of vitamins has no significance, however, for adults, and in the case of infants the remedy is to give orange-juice (containing vitamins) along with the pasteurized milk—not to risk fatal intestinal or other disorders by feeding raw milk.

In general, cookery is one of the most important of sanitary arts and makes safe many of our foods which would otherwise be dangerous. It must be remembered, however, that any food, cooked or uncooked, may be infected by the "carrier in the kitchen." The safeguards against this danger are the cultivation of habits of personal cleanliness, the regular washing of the hands before handling food, and the exclusion (so far as possible) of those persons who are

suffering from any symptoms of communicable disease from the preparation and handling of food for others.

CHARLES-EDWARD AMORY WINSLOW.

Milk Poisoning, Ptomain Poisoning, Meat, Fish, Fruit, and Vegetable Poisoning

MILK POISONING

Poisoning occurs more often from milk than from any other food. It is a wonderfully good food for germs as well as for man, and the germs not only live in it, but multiply tremendously. There are always germs in milk, even in boiled milk, unless it has been boiled several days in succession. Raw milk contains to the teaspoonful from 5000 bacteria, in the very cleanest and most expensive certified milk, to 5,000,000 or more bacteria in market milk. In fact, the poorer samples of market milk contain more germs than sewage. The germs are derived from the surface of the cow, from the air and dust, from flies, from the inside of the cow's udder, from the inside of the bowel (in manure), and from milkers, dairy employees, milk utensils, and water.

The chief source of infant mortality in the past has been through the diarrheal diseases in summer, due almost wholly to the contamination of milk with cow manure which contains putrefactive germs from the cow's bowels. It has been estimated that ten tons of manure have been sold daily in the milk of our largest city in years gone by. Conditions have enormously improved. The infant mortality has been reduced one-half or more by the enforcement of sanitary conditions and the improvement in the milk supply. This was notably so in the case of Rochester, N. Y., during Dr. Goler's régime. The other disease most frequently taken from the cow is tuberculosis. This chiefly affects children, as there is little danger to adults

in drinking milk, since they are comparatively immune to such infection by the time they have reached maturity. About 15 per cent. of the deaths from tuberculosis in infants is due to cows' milk. Another frequent danger from milk is infection with the diseases of man. Thus, there have been recorded within the past few years outbreaks of thousands of cases of scarlet fever, diphtheria, typhoid fever, and tonsillitis from drinking milk.

Among 253 such epidemics (Trask) there were 179 cases of typhoid fever, 51 of scarlet fever, and 23 of diphtheria. Typhoid fever is contracted from milk more commonly than from any other source in New York City today. Within five years in Boston there have been some 3000 cases of typhoid and scarlet fevers and diphtheria traced to milk alone.

These diseases are conveyed to milk by the hands, by the mouth in tasting milk, by bowel discharges of man (sewage) in the water used to wash dairy utensils, and by infection of milk in return bottles from homes in which disease exists. The particular danger which it seems practically impossible to avert is from "carriers"—apparently healthy dairy employees who carry about disease germs in their throats (diphtheria, tonsillitis), or are passing them continually from their bowels years after recovery from typhoid fever. We have alluded in another place (see page 148) to the 1911 outbreak of tonsillitis or septic sore throat in Boston, consisting of 1048 cases with 48 deaths, due to infection of milk from an apparently healthy employee at a show farm. Then there was the typhoid epidemic of several hundred cases the same year in New York, originating from a healthy farmer who had been discharging typhoid germs from his bowels for twenty-six years since his sickness, thus contaminating his own milk supply.

Now, in the cleanest milk it may be impossible to eliminate some of these dangers. Manure may be usually kept out of it sufficiently to prevent infantile diarrheas, but accidents occur. Disease of the cow's udder may appear and pus escape in milk long before the most careful supervision detects it. A leading sanitary milk expert, Dr. North, figures that a ton of pus, blood, and bacteria from diseased udders, together with other dirt, might be separated from New York's weekly milk supply. Inflammation of the udder (garget, mastitis) is a common trouble in cows. An expert may find one or more cases in every considerable herd. The germs (streptococci) in milk from an inflamed udder may also cause outbreaks of severe sore throat or tonsillitis in man just as do the same germs from the human throat which accidentally contaminate milk (see above). Cows may be taken into herds which are tuberculous before the test can show this condition. North estimates the existence of 5 per cent. of tuberculous cows in tested herds supplying certified milk—20 to 40 per cent. of cows have been found tuberculous in famous certified herds (see page 120). Finally, employees infect milk unknowingly and so produce thousands of cases of illness. All these accidents being possible in the best dairies and actually occurring, how can they be stopped? By only one measure, and that is, cooking the milk.

This means pasteurizing milk, or heating it to 145° F. for thirty minutes, followed by rapid cooling. By this degree and duration of heating disease germs of all kinds are unquestionably destroyed.

The proportion of germs, other than disease germs, which are killed varies, and the more germ-laden the milk before heating, the more so is it apt to be after pasteurization.

In other words, but a certain percentage of the miscel-

laneous germs are killed. Thus, in a sample of milk containing 400,000 germs per $\frac{1}{4}$ teaspoonful before pasteurization there were 23,000 after its completion; while a sample of milk holding 40,000 germs to the $\frac{1}{4}$ teaspoonful before pasteurization was found to contain 3000 afterward. But commercial pasteurization is uncertain, and through carelessness and break-downs in the machinery the product is often unsafe. Moreover, outbreaks of disease have occurred from pasteurized milk which was infected by handling it during the subsequent bottling. The only safe commercially pasteurized milk is that bottled at the farm or dairy and then pasteurized in the bottle, as is done at the Deerfoot farm in Southboro, Mass., and in a few other places.

But it is perfectly possible to secure a safe milk by buying the best to be obtained and pasteurizing it at home. I find by boiling water (as much as possible) in the outer part of a 2-quart double boiler, and then removing it from the stove and placing a quart of milk in the covered inner part, that the milk may be brought to 140° or 145° F. within ten minutes and retained at this point for thirty minutes, with the exception of a loss of 2 degrees during the last five minutes. The milk should be kept during this time in a warm place or covered with a cloth.

By the use of a dairy thermometer, sold by druggists, any intelligent person can secure this result, and by taking the same quantity of milk and water each day, after the proper conditions have been fulfilled, one may repeat the process indefinitely without recourse to the thermometer.

The cleanest milk is that most suitable for pasteurization since the heating only destroys a percentage of bacteria, and the poisons which the germs produce in their growth are not necessarily destroyed by heat, although usually they are.

So that one should buy certified milk if it is within one's

means, or the best milk obtainable, and then pasteurize it. For pasteurizing milk for babies the Freeman pasteurizer is most convenient, as the process is done by simply filling the nursing bottles with milk for the twenty-four hours' use, and placing them in boiling water in his machine after it has been removed from the stove. It is just as important that cream and milk for making butter and cheese be pasteurized, as disease germs live in these articles for months. This is not, however, generally done in this country.

Ice-cream is a frequent cause of poisoning when it has been stored for some time before using. The most enormous number of germs ever found in (sweet) milk products exist in ice-cream after it has been kept for some time, even at zero temperatures. Over 100,000,000 bacteria to the teaspoonful is not unusual, as the intense cold does not prevent the multiplication of bacteria (in the course of time). The safeguard is to make ice-cream from fresh pasteurized cream at home, or to only buy it from dealers upon whose word one may place dependence. The greatest danger lurks in the street and small store vendor, who hawk unknown and questionable products about among the poor and serve them broadcast in the popular "cones." Ice-cream, cream-puffs, and custards, made from germ-laden milk or cream, are capable of producing the most intense digestive disturbances, with vomiting, colic, diarrhea, and even death. Considering the opportunities at every soda-water fountain, and the fact that fragile children are the victims, it is a marvel that the sickness and death resulting are not greater. The Chinese are much more advanced than ourselves in some respects, despite our boasted civilization, for they drink no uncooked milk or water, and thus escape typhoid fever, which is common among the Europeans in China.

The poisoning from eating ice-cream, cheese, cream-puffs, frozen puddings, and custards is more often due to milk contaminated with the discharges of cows (manure, etc.), and sometimes is derived from milk of diseased cows.

The germs inhabiting the bowels of the cow are those chiefly responsible (colon and allied bacilli). These organisms produce poisons or toxins leading to vomiting, colic, diarrhea, great prostration, and weakness of the heart. If the milk were pasteurized in the beginning it is probable that the poisons would not be formed. Poisoning from ice-cream, cheese, and custard was formerly attributed by its discoverer, Dr. Vaughan, to a special chemical substance (tyrotoxicon), but it is now recognized that various toxins formed by a variety of germs are responsible for the poisoning, and usually not tyrotoxicon. The author confesses that the milk question is a special personal hobby upon which he is more or less of an authority,[1] but the enormous hygienic importance of a clean milk supply has become more and more evident with the passing of the years and as a result of experience and study.

PTOMAIN POISONING

Ptomain poisoning is a fashionable term covering, in popular usage, symptoms produced by almost any unknown germ disease with abdominal symptoms. As a matter of fact, it does not even mean food poisoning, for food poisoning means damage done by a great variety of poisons or toxins produced by a corresponding variety of germs.

Ptomains are certain definite chemical bodies (basic alkaloidal products) formed in the putrefaction of meat or

[1] "The Production and Handling of Clean Milk," by Kenelm Winslow, M. D., B. A. S., M. D. V., W. R. Jenkins Co., New York, third edition.

vegetables. Only a few instances are known where food poisoning has been due to ptomains, and no statement is correct that such has occurred without an elaborate confirmative chemical analysis. Ordinarily the cultivation of germs from an offending food will explain the cause of poisoning, so that the bacteriologic rather than the chemical laboratory is the authority in such cases.

Ptomain poisoning is an unfortunate word, because, while it may please the patient to be a victim of such a patrician disorder, it permits the doctor to make a wrong diagnosis without let or hindrance. In the writer's experience, ptomain poisoning has most often proved to be appendicitis, gall-bladder trouble, or obstruction of the bowels, and the unnecessary delay has frequently resulted in the patient's death, which might have been prevented by timely surgery. Ptomain poisoning is a cloak of ignorance in the doctor's lexicon, and must be relegated to the same category as "grip" and rheumatism, which include a host of germ infections capable of being recognized. It is somewhat difficult to be certain that illness is due to food poisoning.

The occurrence of a number of cases of vomiting, colic, and diarrhea at about the same time in a number of persons who have eaten the same food (or of nervous symptoms, as in sausage poisoning, appearing some twenty-four to forty-eight hours after eating the food, and consisting in dryness of the mouth, disturbed vision, drooping eyelids, loss of the voice, difficult swallowing, etc.) would be strongly suggestive of food poisoning. The character of the food and the attending circumstances, and, above all, the bacteriologic examination of the suspected food will positively determine the diagnosis.

Meat Poisoning.—Four-fifths of all cases of meat poisoning are due to eating the flesh of animals suffering from one

of the germ diseases, more often cows killed because of udder disease, blood-poisoning following calving, or intestinal diseases; and calves with a form of blood-poisoning common during the first few weeks of life.

Unfortunately, the meat is not altered in appearance in such cases, nor is cooking by any means a sure preventive against poisoning. Even poisoning by meat which has decomposed from too long keeping is much more frequent in the case of animals diseased before slaughter. Expert veterinary inspection of the various organs of slaughtered animals will detect disease and prevent the killing of sick animals for food, which is most apt to occur in small towns where meat for local use is not properly inspected.

Poisoning from meat which has putrefied from long keeping is more common in the warm months and in the case of chopped meat or sausage.

Putrid meat is usually recognizable, if not chopped, by softness and bad odor, especially about the bones and fat. Boiling, roasting, or frying lessens the danger from putrefying meat, but does not absolutely prevent it. Proper refrigeration in the household, both before and after cooking meat, is essential in order to preserve it, otherwise it should be eaten fresh. It is also advisable to clean refrigerators frequently with a hot solution of washing soda. The poisoning is due to toxins or poisons produced by germs which originate in diseased animals, or contaminate the meat after slaughter and grow luxuriantly when refrigeration is imperfect.

It is well known that persons eat game when it is "high" with impunity in most cases, but such meat is usually "hung" in cold weather.

Pork, veal, and beef are the source of meat poisoning, while mutton and lamb are almost always safe, partly be-

cause these are free from the diseases of bovines. Pork causes poisoning because it is imperfectly preserved by salt or smoking, and is often eaten insufficiently cooked in sausage and other forms. Cold storage of chickens, turkey, and other fowl is undesirable because their viscera are not removed. The enormous multiplication of germs at zero which occurs after a considerable period is exemplified in the case of ice-cream noted above. Numbers of instances of poisoning by cold-storage fowl are reported. The government has issued a bulletin on the matter, in which it is pointed out that if the internal organs were removed before storage, and if the fowl were sold frozen and immediately cooked and eaten, such food would be very desirable. As a matter of fact, the dealer often allows the bird to thaw out to improve its appearance before sale. He may then replace the fowl in cold storage and repeat the process several times if a sale is not made.

Canned meat and **canned vegetables** prepared by reliable makers are usually wholesome because thoroughly cooked, and poisoning has been more frequent in the case of home-made products. Usually if the contents are bad the ends of the can will bulge, or the can be "blown," and putrid gas will escape when it is opened. Dishonest dealers are known to have bought blown cans and to have let out the gas and soldered them again. In this case there will be two soldered holes in a can, and such should always excite suspicion. Canned fish and pork and beans have produced reported cases of poisoning. But it is not unusual for the poisoning to follow carelessness in keeping the contents of the can too long after opening. Violent and fatal poisoning has originated from canned string beans, which had a rancid odor when opened. It is always wise to cook all canned vegetables again, as the cases of poison-

ing have often been caused by eating the product in salad or otherwise without recooking. Of course "blown" cans should always be rejected, and makers should be required to record the date of canning on each package, as the danger, together with loss of flavor, increases with age.

Fish and Shell-fish.—There are certain parts of fish in certain countries and at certain seasons which are poisonous, as the roe of the Japanese fugu, the roe of the German barbs, and the roe of pike and meat of sturgeon in the spawning season. The chief cause of poisoning by fish is disease of the fish, or, more usually, that it is kept too long before or after cooking, especially in warm weather.

It is a good rule that fish or shell-fish should be eaten in warm weather within twenty-four hours after they have been cooked. I have seen cases of poisoning from crab where it was kept for three days or more and then served in some new style. This keeping of shell-fish is extremely dangerous, as bacteria grow most luxuriantly in cooked fish. In the same way poisoning from canned salmon or other fish is more often due to keeping the fish too long after opening the can. All fish (not preserved or canned) should be freshly killed and have firmness of flesh, pink gills, and bright eyes. An unpleasant odor would naturally be sufficient to condemn any fish.

Many persons have idiosyncrasies concerning fish and shell-fish, so that an attack of nettle-rash or hives will follow their use. Crabs and lobsters should always be boiled alive and eaten within twenty-four hours afterward, even if kept on ice, although trouble arises chiefly in warm weather and warm climates. When oysters, clams, or mussels live in filthy water they become poisonous through infection with germs from the intestinal discharges of man

and other sources, so that poisoning may be produced when they are eaten. Special diseases, as typhoid fever and cholera, are thus conveyed to man by oysters; and mussels under such conditions may induce the most fatal form of food poisoning known owing to a recognized true ptomain, "mytilotoxin."

Such poisoning may not be prevented by thorough cooking.

Vegetable and Fruit Poisoning.—To go into the details of fungi poisoning is hardly within the province of this work. Of mushrooms and toadstools ten varieties are poisonous, one hundred and fifty are edible, and fifty are of doubtful character among the one thousand varieties in the United States.

One should avoid eating mushrooms which are not familiar unless supplied from a reliable source. The five more common species of edible mushrooms in the United States are the ordinary field mushroom (Agaricus campestris), the horse mushroom (A. arvensis), the shaggy mane (Coprinus comatus), the fairy-ring (Marasmius oreades), and the edible puffball (Lycoperdon cyathiforme). Such popular tests concerning the safety of fungi, as their odor, taste, properties of blackening silver in cooking, etc., are wholly unreliable. If the novice wishes to gather mushrooms to eat he should first receive field instruction by an expert and not trust wholly to book learning. The swallowing of one-sixth of a mushroom has caused death, so that this is no matter for trifling (see Bull. No. 15, U. S. Dept. Agric., "Some Edible and Poisonous Fungi").

Poisoning sometimes occurs from potatoes, surprising as this may seem. Potatoes belong to the family (Solanaceæ) of poisonous plants containing belladonna, hyoscyamus, and stramonium. However, it is not always the poison (solanin) which causes poisoning in those eating

potatoes, but a variety of toxins produced by a variety of bacteria conveyed to potatoes by handling them after cooking. Solanin is found chiefly under the skin of potatoes and diminishes to nothing in the center of the tuber. It is only present in harmful amounts and on rare occasions in sprouting potatoes, in green potatoes growing uncovered by earth, and sometimes in young potatoes. The sprouts, especially the purple ones, are apt to contain more of the poison. Poisoning from potatoes is most common in warm weather and has often happened in potatoes which have been kept for a day or two after boiling and then made into salad.

The bacteria were probably conveyed to the cooked potatoes by persons with unclean hands. While severe vomiting, colic, diarrhea, and great weakness have been caused by potato poisoning in large numbers of persons, there has been no fatal result in 600 recorded cases. To prevent poisoning green potatoes and all those badly sprouted should be rejected, and other potatoes should have all sprouts cut out and the peel widely removed before boiling. There have been no cases of solanin poisoning from baked potatoes. To avoid poisoning from cooked potatoes they should not be kept any length of time after boiling, and great cleanliness of the hands is necessary in handling them, as germs grow and multiply enormously on the potato, especially in warm weather, hence the reason for potato-salad poisoning.

A mild poisoning is commoner after eating strawberries than any other vegetable food. Indigestion and particularly hives or nettle-rash are the more frequent results. Strawberries lie on the ground and come in contact with animal and sometimes human excrement used for fertilizer.

They are eaten raw, and it is remarkable that more

cases of severe poisoning do not occur, as the more common forms of food poisoning are due to contamination with bacteria from the intestines of animals and man.

Metchnikoff believes the eating of uncooked strawberries a very dangerous matter, and goes so far as to attribute appendicitis to the fruit. Many persons cannot eat strawberries unless cooked.

CHAPTER XVI

DISORDERS OF NUTRITION

Beriberi, Scurvy, Rickets, Pellagra, Obesity, Diabetes

BERIBERI

Beriberi is a peculiar disease resulting from disorder of nutrition owing to the absence of certain unknown elements, or vitamins, in the food.

Vitamins are substances existing in food and essential to growth and life. Certain disorders, as rickets and scurvy in children, scurvy in adults, softening of the bones in pregnant women, pellagra, and beriberi are caused by food deficient in these substances. Grains when deprived of their germ and outer coating, as wheat, rice, barley, and oats, will produce beriberi in many birds and animals. Vitamins are also destroyed by heat and by drying and pickling.

In the case of beriberi experience and experiments show that a diet of rice, from which the outer coat and germ have been removed, is the more common cause. This is called white rice or polished rice, and is what we ordinarily use. In preparing white rice it is steamed, the outer red covering bursts, the grain is dried, the hulls, with germ, removed, and the rice is polished in milling. Red rice, covered by its natural coats, will not induce beriberi. The most interesting experiments have been tried, as in the case of the inmates of the insane asylum at Singapore, where formerly half died of beriberi. It was

found that the disease could be produced or cured at will by feeding first polished rice and then unpolished rice.

In India a group of men was given polished white Siam rice and developed beriberi in sixty days, while another group living under the same condition, but eating only unpolished rice, remained free from the disease. But when this second group was fed polished white rice beriberi developed within two months. By exchange of clothing and contact of the well with the sick it was shown that the disease was not infectious or contagious.

The same results have been obtained in Japan and the Philippines. As many as 50,000 cases of beriberi arose from the feeding of polished rice to the Japanese during the Russian War, but recent knowledge of the cause of the disease has enabled the authorities to stamp it out. Osler states that "there has been no more remarkable triumph of modern hygiene than Takagi's dietetic reforms in the Japanese navy." Schaumann and others went further, and concluded that deficiency in phosphorus, as it occurs in combination in vegetable or animal tissue, is the true cause of the disorders of nutrition above mentioned. He and others found that rice which contained less than 0.4 of 1 per cent. of phosphorus is likely to produce beriberi. This conclusion has not been wholly accepted, since Funk claims to have isolated a new substance, or true vitamin, the deficiency of which in food is the cause of beriberi and which does not contain any phosphorus. It is unquestionably a fact that the feeding of the polishings (germ and bran) of rice will cure beriberi, and it seems probable that food contains often more than one vitamin—some for growth and others for proper nutrition. Thus in milk there is a vitamin destroyed by heat or boiling, and pasteurized or boiled milk may cause scurvy. But other vitamins in milk survive heat, for in dried milk the vitamins are still

present that will cure beriberi and that are essential for growth of young animals. When there is a deficiency of vitamin in food the animal or man must use up that already in the body, so that some of the tissues are damaged. In the case of beriberi it is the nervous system which is involved. At present we must confess our ignorance of the precise nature of vitamins, although evidence points to either phosphorus or nitrogen as being their most likely chemical constituents. But we do know that there are essential unknown substances in many foods which are destroyed by removal of the germ and outer hulls of grains, or by boiling, heat in any form, drying, canning and pickling, and that deficiency of these bodies in food gives rise to the diseases already enumerated. That while rice germs and hulls contain the essential vitamin curing beriberi, the vitamin curing scurvy resides in fresh vegetables and fruits, as in fresh onions, potatoes, cabbage, lemons, limes, oranges, apples, etc.

White bread (deprived of the bran and the embryo or germ of wheat) is the most important food from which vitamin is removed, but all sorts of prepared foods in which the hulls are taken from grains or in which heat is used, as condensed and dried milk, dried eggs, infant and invalid foods, vegetable and meat extracts, and canned food or dried or pickled meat, are deficient in vitamins and instrumental in causing the diseases noted above. This explains the reason for beriberi developing on ships where the crew live on pickled meat, dried potatoes, rice, white flour bread, and biscuit.

Beriberi has occurred most extensively in the Orient, the Chinese and Japanese subsisting largely on a rice diet. The disease has existed in the Philippines, India, and South America, among fishermen in Europe and on the Newfoundland Banks, on shipboard, and in this country in

camps, mines, and asylums. It does not develop in persons living on a varied and mixed diet and in good surroundings and circumstances. The lack of vitamins is only felt hy those on a restricted diet, usually from poverty. Poor children are stunted from being fed largely on white bread. The poor of the South develop pellagra from a diet of starch and sugar. Babies fed on heated milk have scurvy (see p. 303). Starch and sugar contain no vitamins. Fresh meat, milk, eggs, vegetables, fruits, and germs of grain abound in them.

Symptoms.—Beriberi is from twenty days to two to four months in developing and may last many weeks or months. The death-rate varies tremendously—from 2 to 50 per cent. The disease is essentially an inflammation of the nerves throughout the body (polyneuritis). It begins like a bad head cold, with pains, swelling, and loss of sensation in the limbs. There may be complete loss of sensation and power in the arms and legs, although pain, crawling sensations, and other peculiar feelings are common in the limbs. The muscles are tender and may waste away or there may be extreme dropsy and the whole body swells. The breathing becomes difficult, the heart is weak, and the pulse rapid.

Prevention consists in change in the diet depending upon the cause. In most cases this has been the extensive use of polished white rice, and the substitution of this for unpolished rice is usually sufficient.

The government in the Philippines has forbidden the use of polished rice among the native troops and in its institutions. Thus, in the leper colony there were 309 deaths in 1910 from beriberi, but after changing the diet from polished to unpolished rice not a single case of the disease developed in the following year. There is also a duty of $2\frac{1}{2}$ cents a kilo (2.68 pounds) on polished rice imported into

the Philippines to discourage the natives from using it. Improvement in the general hygienic conditions is essential in the treatment of beriberi and the use of tea made from rice hulls or polishings, or when a liberal diet is possible this may be given without rice. It is a very chronic disease and treatment in hospitals is advisable. There is dropsy or fluid in the cavities of the chest and belly, so that rest in bed and saline cathartics tend to drain away the fluid, while heart stimulants are often required.

SCURVY

Scurvy has been called "the calamity of sailors." It occurs in cities during sieges, in armies, almshouses, mining camps, and wherever the diet is deficient in fresh meat, milk, vegetables, or fruit. Certain other circumstances predispose to scurvy, as depressing conditions, homesickness, fatigue, and exposure to wet.

Persons with scurvy become pale, weak, and emaciated. Their gums are soft and bleed easily and their teeth loosen. Purple spots are seen on the skin which do not disappear on pressure. The ankles swell and open sores may develop on the legs. Apathy, headache, palpitation or fluttering of the heart, and occasionally delirium occur.

Scurvy is due to deficiency of some essential substances in the food or of one of the vitamins (see page 297). Cooking, heating, drying, and processing in the course of manufacturing food products destroy the substances which prevent scurvy. Food which is kept a long time may cause scurvy, so it is substances which exist in fresh food that protect against scurvy; fresh meat and blood in the Nansen expedition prevented scurvy in the absence of vegetables and fruit juices. Fresh onions, potatoes, cabbages, carrots, and dandeloins are commonly used to cure or prevent scurvy.

Animals fed for weeks on flours of various grains minus germs and hulls, or on potatoes which have been dried and then boiled, develop scurvy. It has long been taught that only milk heated to high temperatures (108° F.) or boiled caused scurvy. Hess has recently shown that heating milk to 145° F. (pasteurized milk) will kill vitamins, and produce scurvy in infants taking it exclusively without orange juice.

Scurvy in infants is usually caused by heated condensed or boiled milk or infant foods of all kinds, although it occasionally develops when the baby is on its mother's breast milk, probably depending on lack of vitamins in the mother's food. Cabbage juice loses its antiscorbutic (against scurvy) action when it is heated to 145° F., but lime juice boiled one hour still contains its vitamin against scurvy. For the reason that lime juice holds its antiscurvy property so tenaciously it is the great preventive of scurvy in English ships, called popularly "lime juicers."

Many authorities think that phosphorus is the essential vitamin in food which prevents scurvy and pellagra as well as beriberi. This is still but a hypothesis.

Scurvy is seen in infants between the ages of six and eighteen months usually, and in those who have lived on boiled or condensed or proprietary foods.

The first *symptom* is shown by the baby crying on being moved or handled, and the pain is chiefly in the legs. The baby is then thought to have rheumatism. At first the baby lies with the legs drawn up, but after a while the thighs or legs swell and the limbs are held out straight and rigid, with the toes pointing outward. Neither does the baby voluntarily move the affected leg freely. One limb is more often involved, but in bad cases both arms and legs are attacked. The swelling may be about the joints or of the whole limb. When there are teeth the gums bleed

easily and there may be purple spots on the skin, blood in the urine, and rarely in the bowel discharges. In scurvy in adults and infants there is alteration in the blood and vessels, and a tendency to hemorrhages. In scurvy of infants the ends of the bones often break without any apparent cause.

Prevention of scurvy in infants may be absolutely assured by feeding 2 teaspoonfuls of orange juice or juice squeezed from fresh beef three times daily. Orange juice is best and should always be given when pasteurized, boiled or condensed milk, milk powders or patent foods are used. The same treatment will cure babies of scurvy within a few days after putting the patient on a diet of unheated milk.

Scurvy in adults is prevented by a diet containing either fresh meat, milk, vegetables, or fruit, or by lime juice or other antiscorbutic articles required on shipboard. In adults very sick with scurvy the use of fresh milk, meat juice, and scraped beef, followed by potatoes, lettuce, and cabbage when the digestion is stronger, will rapidly cure the disease.

RICKETS

Rickets is a common disease of infants (occurring in 50 to 80 per cent. of babies) between the ages of three months and two years among the less favored classes in large cities.

It is essentially a disease caused by improper diet, usually occurring in infants fed on condensed milk, proprietary foods, or on cows' milk not properly diluted to suit the digestion. When an infant nurses the breast more than nine months the milk will usually be found deficient in quality. Babies who are fed only milk when over a year old or largely starchy proprietary foods are prone to rickets. No infant who receives a well-balanced diet and assimilates it will develop rickets.

Rickets, like pellagra, is apparently due to a diet deficient in proteins and perhaps fats, and there is evidence to show that sufficient vitamin is also lacking, according to the theory of beriberi and other of these nutritional disorders. In rickets there is absorption of bone already formed and impairment in the bone-making functions, so that lime salts are not readily assimilated.

Symptoms.—No single symptom will enable us to diagnose rickets, but only the general picture is characteristic. The infant is pale and puny, with soft, flabby flesh. He seems sore on being handled and often has a temperature of 100° to 101° F. at night. The head is large for the body and face, teething is much delayed, and the soft spot in the top of the skull may not close until the third or fourth year. The normal child's head increases in circumference about 4 inches the first year (3 inches the first six months) and but 1 inch the second year, and when the growth is much greater the case is apt to be one of hydrocephalus rather than rickets. Normally the first teeth (the two lower front teeth) appear from the sixth to the eighth month, and the soft area in the top of the head is closed with bone by the twentieth month. The baby is fretful, subject to colds, does not sleep well, and sweats about the head and neck at night.

The chest is often deformed, so that the breast bone projects (pigeon-breasted), and the spine may be bowed. There is often a vertical row of little lumps on the ribs on either side of the breast bone. The child is pot-bellied and bow-legged, less often knock-kneed. There is a tendency to attacks in which the child loses its breath and gets black in the face, and convulsions are not infrequent.

Prevention.—If the infant is on cows' milk it is probably too rich and should be properly diluted (see pages 217–223), or, if heated, orange juice should be given.

Artificial foods and condensed milk must be discontinued. After the first year meat juice, scraped beef, oatmeal, boiled egg, and butter should be added to the milk diet. Pure cod-liver oil (Peter Moller's) in doses of 10 to 30 drops at six months; or, from six to twenty months, 20 to 60 drops (or a teaspoonful), given three times daily after meals, is most beneficial. The baby should be bathed in a brine bath at night, consisting of water at 95° F., to which is added a level tablespoonful of salt to the gallon. Following this 2 teaspoonfuls of lard or cacao-butter should be thoroughly rubbed into the skin for ten minutes.

If there is deformity in the legs or back the child should be kept on his back most of the time, not being allowed to stand until some three or four months of treatment have elapsed. There should be plenty of fresh air in the room.

PELLAGRA

This is a peculiar disease, beginning in Spain (1762), spreading to Italy and France, and within six or more years becoming quite prevalent in the southeastern part of the United States.

The digestion, skin, and nervous system are particularly affected. The disease is more common in the spring and fall and return of the disorder is also frequent at these seasons. It occurs in persons more often between the ages of twenty and forty. The patient feels weak and depressed and has headache; the digestion fails and there is soreness in the mouth, nausea, vomiting, and painful watery or bloody diarrhea; the skin on the backs of the hands, face, neck, and feet becomes red and puffy and looks as if it were badly sunburned, and later peels, and the skin is left thickened and reddened. In the more severe cases blisters form. The nervous symptoms include headache, dizziness, mental depression, irritability, change in disposi-

tion, and failure in mental powers, so that the patient hears imaginary voices or sees imaginary objects. Severe cases occur with fever, stupor, delirium, and death within a few weeks. Chronic cases recur in spring and fall from year to year, with failing mentality in many instances, so that patients become inmates of insane asylums.

Pellagra is not contagious nor is it conveyed by flies or other means. It was formerly thought to be due to eating Indian corn, especially spoiled corn. Recently the United States Public Health Service has declared the cause of pellagra to be the eating of too much starch or, in other words, the lack of vitamins and protein, especially during the winter months in the South.

It is affirmed that if the inhabitants in the pellagra section will eat sufficient lean meat, eggs, milk, and fresh or dried peas and beans the disease will be prevented and in most cases patients will be cured by such a régime. A daily winter diet for patients of 6 glasses of milk, 4 eggs, and $\frac{1}{2}$ pound of lean meat, with dried peas and beans or pea or bean soup, is used for cure. Patients with little digestive difficulty may take, in addition to the foregoing, fruits, potatoes, onions, rice, oatmeal, and wheat and rye bread, but no corn in any form. Healthy persons living in the pellagra section should see that their diet contains a liberal amount of lean fresh meat, milk, eggs, and in winter beans and peas, dried but not canned. By such means the disease may be prevented. Corn should be eaten in but small amounts, as it is too rich in starch. The Japanese beriberi is an analogous disease apparently caused by eating polished rice, a pure starch diet. Pure starch and sugar are absolutely wanting in vitamins (see page 297). Still more recently (1915) the United States Public Health Service has proved their contention apparently as to pellagra being a dietetic disease. Feeding 11 prisoners at

Jackson, Miss., on cereals, molasses, potatoes, sugar, and syrup for six months 6 contracted pellagra. Some 20 men living under precisely the same conditions in the same penitentiary, except for the special diet, failed to develop the disease in a single instance. It is only proper to say that many students of the cause of pellagra differ from the government authorities as to its origin, believing it to be due to some specific germ.

OBESITY

To estimate the meaning of obesity a knowledge of the normal weight is necessary. In the table on page 308 is given the average weight of healthy men for different ages and heights.

A simple rule of insurance companies is that a weight of over 3 pounds to the inch in height is excessive, while a weight under 2 pounds to the inch in height is below normal. Weight is of importance in respect to age. Heavy weight in persons over forty is a decided disadvantage from a life insurance point of view, their death-rate being much above the average. On the other hand, individuals of light weight past middle age have as good an expectancy of life as those of normal weight. Young persons under weight, especially if there is a history of consumption in the family, have a mortality much above the average. In young individuals, otherwise healthy and of good physique, overweight is not unfavorable from the insurance viewpoint unless the abdominal measure exceeds that of the chest, which is undesirable at all ages. Insurance statistics show that certain diseases occur more often in the stout after middle age, as heart disease, bronchitis, constipation, piles, diabetes, gout, stone in the kidney, and Bright's disease of the kidney. Hardening of the arteries and apoplexy are more frequent in the obese, and they have

TABLE OF HEIGHTS AND WEIGHTS

Showing the Variations from Light to Heavy Weight. Within these Limits Build is Assumed to be Normal. (Fidelity Mutual Life Insurance Co.)

Height	Ages 15–29	30–34	35–39	40–49	50–60
5 ft.	117	114	110	106	103
	154	152	148	146	143
5 ft. 1 in.	118	116	111	108	104
	156	155	151	149	145
5 ft. 2 in.	120	118	113	110	106
	159	157	153	151	147
5 ft. 3 in.	123	121	116	112	108
	162	161	156	154	151
5 ft. 4 in.	126	123	119	114	110
	166	164	161	157	154
5 ft. 5 in.	130	127	122	118	113
	171	169	166	162	158
5 ft. 6 in.	133	131	126	121	116
	176	174	170	166	162
5 ft. 7 in.	137	134	129	124	120
	181	179	175	171	167
5 ft. 8 in.	141	139	133	128	124
	186	185	181	176	173
5 ft. 9 in.	145	142	138	132	128
	191	190	186	182	178
5 ft. 10 in.	149	147	142	136	131
	196	196	192	187	183
5 ft. 11 in.	153	151	146	141	135
	202	202	198	194	189
6 ft.	159	157	150	146	140
	210	209	205	200	195
6 ft. 1 in.	165	162	156	151	145
	217	216	212	208	202
6 ft. 2 in.	170	167	162	157	150
	224	223	220	216	210
6 ft. 3 in.	176	173	167	162	155
	232	230	227	223	217

less resistance to surgical operations and acute diseases, as pneumonia and typhoid fever. For these reasons the insurance companies reject or handicap overweight individuals at or after middle age unless there is a family history of obesity with longevity. As to the cause of obesity: In a general way overeating and lack of exercise

are responsible for much fatness. Heredity is important. The secretions of certain glands in the body are absorbed into the blood and increase or diminish the tendency to fat formation. Thus, when either sex is castrated (removal of either the testicles or ovaries) the secretions of these glands are stopped and stoutness is apt to follow. The same result occurs at the change of life in women when the ovaries cease to secrete. Stoutness is seen in eunuchs and in women whose ovaries are removed in early life for disease. With partial removal (posterior lobe) or disease of the pituitary gland at the base of the brain there is great increase in weight. Giants are formed through disease of this gland. Great obesity in children is frequently due to disorder of the pituitary gland and is often associated with poor sexual development.

On the other hand, an excess of secretion of the thyroid gland in the neck produces emaciation in some forms of goiter, and the dried sheep's gland is sometimes given to reduce obesity in man.

Symptoms.—The physical inconvenience caused by obesity and the injury to the figure in women are the common complaints. Walking and exertions of all kinds are difficult, while the breathing is short and the heart's action is embarrassed. The pulse is apt to be more rapid, and the urine is scanty compared to the amount of fluid taken, because of easy perspiration, and, for the same reason, colds are more frequent. Indigestion may develop and constipation and piles are common. Impotence sometimes occurs in the male. Sleepiness is frequent in fat young people, as made famous by the fat boy in "Pickwick Papers." Common observation shows us, however, that obesity is compatible with not only long life, but great activity and vigor.

Treatment.—All reduction cures are starvation cures.

None supply enough food for the permanent needs of the body. It is a reduction of quantity rather than quality of food which counts. Still, the kind of food is of importance. The amount of food given in reduction cures is equal to from one-half to as low as one-third of that required to maintain a normal individual. The fat of the body is thus burned up to supply the individual's needs. The danger lies in the fact that not only the fat, but the substance of the muscles and tissues generally may also be broken up if the starving is continued too long. If this happens, the subject will feel weaker. No reduction cure should be continued unless the patient feels stronger for it. Frequent meals tend to prevent a feeling of weakness. As a general rule dieting is not advisable for persons over fifty or under twenty. Those who have been fat for a great many years are not favorable subjects for reduction. Reduction is always better undertaken under a physician's care, and it should never be carried out by the patient unless otherwise in good general health. The reduction of fat in certain disorders, as in tuberculosis, might be fatal.

A patient should not lose more than 6 to 8 pounds a month for two or three months. Then the diet may be increased so that the weight is maintained at a level for two months and the cure instituted again. None but robust individuals should lose as much as 40 or 50 pounds in a year, and they should feel the stronger for it. Fatness in children should be discouraged by the avoidance of sweets, starches, as cereals and fats, and by the use of outdoor exercises, but not by a strict diet.

Food is generally divided into fats, starches and sugar, and proteins. The latter include pure meat and fish free from fat, skimmed milk, white of egg, and a portion of vegetables, as gluten in flour. Proteins build tissue in the

growing, and repair it in adults, but do not make fat. Sugar, starches, and fat make fat and must be chiefly cut out in the reduction diets. In the following diet list the fat is but one-third to one-half and the starches and sugars but one-fifth to one-half of what are required in a normal diet, while the amount of proteins is about the standard for normal adults. The special diets given in most medical text-books are of German origin, as Oertel's, von Noorden's, Epstein's, etc., and include articles often not palatable to us, as cold meat for breakfast, Rhine wines in considerable amount, etc.

The following diets are those particularly in vogue.

The Oertel cure requires that the liquid be reduced to $2\frac{1}{2}$ pints, including water and all other fluids taken in the twenty-four hours, thus:

Breakfast: 6 ounces of tea or coffee with milk and 3 ounces of bread.

Lunch: 3 to 4 ounces of soup, 7 to 8 ounces of meat, a little fish, 1 ounce of bread or sago, rice, tapioca pudding, 3 to 6 ounces of fruit for dessert, 1 glass of water.

Afternoon Tea: 6 ounces of tea and a glass of water, 1 ounce of bread.

Supper: 1 or 2 soft-boiled eggs, 1 ounce of bread, small slice of cheese, salad and fruit, 1 to 2 glasses of liquid.

von Noorden's diet follows:

Breakfast (8 A. M.): Lean meat $2\frac{2}{3}$ ounces, 1 cup of tea with spoonful of milk, no sugar, bread $\frac{5}{6}$ ounce.

10 A. M.: One egg.

12 M.: A cup of strong meat broth.

1 A. M.: A small plate of vegetable and meat soup, 5 ounces of meat and fish, 3 ounces of potatoes with salad, $3\frac{1}{3}$ ounces of fresh fruit without sugar.

4 P. M.: 6½ ounces of fresh fruit.
6 P. M.: ½ pint of milk with tea.
8 P. M.: 4 ounces of cold meat or 6 ounces of raw meat cooked and eaten with salad, 1 ounce of Graham bread and 2 or 3 spoonfuls of cooked fruit without sugar.

The amount of liquids, as water, weak tea or lemonade, at or between meals is not limited. von Noorden believes the numerous small meals prevent weakness.

Bouchard's diet consists wholly of 2½ pints of milk and 5 eggs per day; in other words, a glass of milk and 1 egg at 7 and 11 A. M. and 3, 7, and 11 P. M. for twenty days.

Most of the diets cut down on starches, fat, and sugar required in a normal diet, while increasing from one-third to one-half the amount of proteins as represented by meat, fish, milk, and egg. They represent about one-half the food value required by the normal person.

The so-called milk-cure is one of the simplest and may be used even in disease of the heart or kidneys (with a doctor's permission), as it increases the action of the kidneys and is particularly applicable in the case of persons with abdominal fat.

Breakfast: 1 pint of milk.
Lunch: 6 ounces of lean meat with green vegetables, as spinach, green peas, string beans, lettuce. (No bread or potatoes, but beets, turnips, parsnips, cabbage, Brussels sprouts, carrots may be used in place of green vegetables.) One-half pint of milk, 2 glasses of water or cups of tea with a little sugar.
Tea (5 P. M.): ½ pint of milk or junket, 2 cups of tea with a little sugar.

Supper (7 P. M.): 1 pint of milk and 2 apples (they may be cooked).

In place of the midday meal only 1 pint of milk may be taken in the case of robust persons. If the subject remains at home he may take the milk more frequently, 8 to 9 glasses daily, with only the apples, tea, and water, if the noon meal is abstained from.

Ebstein's diet contains 3 pints of liquid, including 2 cups of tea, as follows:

Breakfast: Bread, 2 ounces, with plenty of butter (bread may be toasted); large cup of tea at end of meal, without sugar.

Lunch: Fat meat, ham, or fish, 4 ounces, or 1 egg, bread and butter, 1 ounce; green vegetables or salad and fruit.

Tea: Cup of tea, one slice of bread and butter, or biscuit.

Dinner: Cleat soup, meat 5 or 6 ounces, cabbage, peas, string beans or spinach, as much as wanted, raw fruit or salad, small piece of cheese and a cup of tea at end of meal, 5 glasses of water should be taken between meals. This diet allows fats, but excludes starches and sugar, and contains half the normal food requirements.

Dr. E. A. Locke's diet has been found by the writer the most sensible and is in accord with our customs. It follows:

Breakfast: 1 cup of black coffee (no cream or sugar), 1 or 2 boiled or poached eggs, 1 or 2 small slices of toast without butter, an orange, apple, pear, or one-half a grapefruit.

11.30 A. M.: A glass of milk, buttermilk. or some fruit.

Luncheon: One cup of clear soup, 3 ounces of meat, eggs, or fish, two varieties of green vegetables, 2 to 4 ounces each, raw fruit.

5 P. M.: Tea without cream or sugar, one small slice of toast.

Dinner: Raw oysters, lean met or fish, 4 to 5 ounces, two green vegetables, 2 to 4 ounces each, salad of fruit or vegetables with a small amount of French dressing, raw or unsweetened cooked fruit, demi-tasse of black coffee.

The following articles are to be avoided:

Starches.—White potatoes, except in small amount, bread, crackers, cereals, macaroni, vermicelli, spaghetti, sago, tapioca, cornstarch, sweet potatoes, shell beans, dried peas or beans, corn, and nuts.

Sweets.—Sugar, candy, dried fruits, syrups, fruit preserves, honey, marmalade, and sweet sauces.

Meat.—Pork, bacon, goose, sausage, croquettes.

Fish.—Shad, fresh salmon, eels, sardines, mackerel, bluefish, and fried fish.

Fats.—Butter, cream, olive oil, bacon, lard, fat meat, and fish.

Dessert.—Ices, rich puddings, cake.

Miscellaneous.—Chocolate, alcoholic drinks, except claret and Rhine wines, thick soups, milk, cheese, pickles, condiments.

This diet contains a third to a little over one-half the food value required by a normal person weighing 150 pounds. For a heavy person the food is correspondingly deficient, so that he will live on his fat while on the diet.

Water is not curtailed in Locke's diet, as in many diets for reducing fat, but water should only be taken after rising and between meals and at bedtime.

Water taken at meals increases the appetite, and some authorities believe the absorption of food as well.

It is advisable that the patient should actually weigh his food at first and then he can judge later of the amount he should take by bulk. The patient should weigh himself daily and keep a weekly chart of his weight. The appetite will be hard to curb at first, but after a few weeks there should be no trouble on this score and the strength and appearance should improve. Prolonged chewing lessens the appetite.

The diet may be followed until the weight becomes normal for the height of the subject. Then the diet may be somewhat increased, being careful not to take too much sugar, fat, and starches, as potatoes and bread. Exercise is most important during the cure, and swimming, riding, golf, and walking, as three-quarters of an hour in the morning and one-half hour in the afternoon, are to be recommended. Exercise with a heavy sweater on will greatly reduce weight through perspiration, providing water is taken but moderately. Massage will to some extent reduce local accumulations of fat, as on the abdomen, but it must be given daily and very vigorously for this purpose. Special exercises are more efficient, as exercises in bending over for removal of fat on the abdomen. Sometimes cathartics are necessary, especially on cutting down the bulk of food. Some saline, as Carlsbad salts in $\frac{1}{2}$-teaspoonful doses (more or less) in a glass of cold water on rising, is suitable.

The whole success of the treatment depends upon the faithfulness with which it is carried out. If thoroughly done the habits will become so changed that it will not be difficult to adhere to a proper diet thereafter.

PREVENTION OF DIABETES

Prevention applies especially to the children of diabetic parents. These should be brought up on a diet from which candy, cake, and sweets generally are largely excluded. Testing the urine at least four times a year in the children of diabetics, in fat adults and in their children, and in those who have previously had sugar in their urine, is of the utmost importance. Since there is an association of diabetes with obesity the stout and their children should reduce their weight by appropriate diet and exercise (see page 310).

CHAPTER XVII

THE PREVENTION OF SOME DEFORMITIES

INTRODUCTORY NOTE

THE way the human body is used is of the utmost importance if proper health and efficiency of the individual are to exist, and to prevent the common deformities seen in human beings the appreciation of this fact is of the greatest consequence.

If the body is used fully erect the muscles as a whole are in their best position for development. The ligaments naturally strengthen, the bones develop without deformity, and the greatest amount of physical energy is available for work. In this position also the chest is so held that the lungs develop properly, the heart is free to perform its work, and the abdomen is so shaped that none of its organs is harmfully interfered with.

If the body is drooped, however, not only are the shoulders thrown forward, but the spine is curved, the knees and ankles are sprung, and the chest is flattened—embarrassing the action of the lungs—so that in consequence the diaphragm is forced downward and the abdominal wall is relaxed, with the natural effect that the abdominal organs are not properly supported and are crowded out of their normal position, frequently resulting in disaster.

The chapter which follows admirably suggests the different features which are of importance in this matter of the prevention of deformities. These if recognized in childhood and properly treated will result in our seeing develop about us strong and healthy boys and girls.

JOEL E. GOLDTHWAIT.

Round Shoulders, Lateral Curvature of the Spine, Humpback, Knock-knees, Bow-legs, Weak Ankles, Weak Feet and Flat-feet

Deformities depend upon weakness of the muscles and ligaments and upon disease of the bones. Bad hygiene

in the child favors general weakness and thus deformities. That is, lack of proper food, exercise outdoors, fresh air, etc. The special diseases of infancy predisposing to deformities are rickets and scurvy, which are considered in another place. In rickets, where the bones are soft, the child should be encouraged to creep and discouraged to stand. Rest in bed until a cure is obtained is often advisable. The diseases which directly cause deformities are infantile paralysis from weakness and paralysis of the muscles, and tuberculosis, syphilis, and gonorrhea, which primarily produce disease of the bones.

But the more common deformities which we will consider are those caused by general weakness or faulty postures assumed during standing, sitting, walking, sleeping, playing, or working. These include round shoulders, curvature of the spine, bow-legs, knock-knees, weak ankles, and flat-feet.

Round Shoulders and Spinal Curvature.—Round shoulders and lateral curvature of the spine are exceedingly common. Many of the same causes act to produce one or both of these deformities. In round back or round shoulders the subject assumes a position shown in Figs. 8 and 9, with back arched, chin thrust forward, chest flat, and lower belly prominent. It follows that if the back is bowed backward the lower part of the abdomen must be carried forward to preserve the proper balance. This position, besides being a great deformity, interferes with the free action of the lungs and heart and causes the abdominal organs to be pushed downward, leading to one of the most common forms of indigestion and having far-reaching consequences (see page 276). In lateral curvature the spinal column, instead of occupying a vertical position, becomes deviated from side to side so that it has a more or less S-shape when viewed from behind. This

deformity is more frequent in young girls (from ten to fifteen years) and is often first noticed by the dressmaker, because one breast is more prominent than the other or because one hip or shoulder is higher than its mate. In Fig. 11 is shown an outline of the back in a case of lateral curvature. In the upper part of the back the deviation is toward the right and in the lower part toward the left.

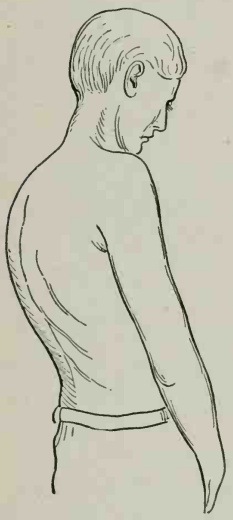

Fig. 9.

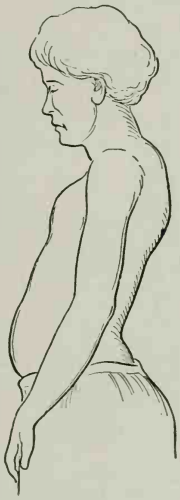

Fig. 10.

The right shoulder and left hip are higher than their mates and the left breast (not shown in the diagram) is also more prominent. When this patient stoops, holding the heels together without bending the knees and inclines the body forward from the hips with the head and arms hanging down, we will observe the deformity of the back as in Fig. 12. This outline shows the ribs bulging outward to the

right of the spinal column owing to the fact that some of the vertebræ are twisted to the right side in addition to the deviation of the whole spinal column. By marking

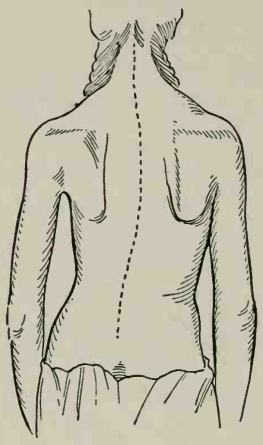

Fig. 11.

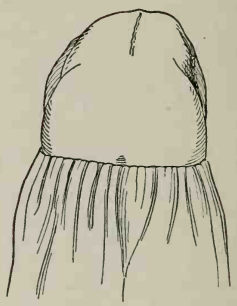

Fig. 12.

with ink the bony prominences along the spine from the neck downward one can readily see whether the spine is straight or not, as in Fig. 11.

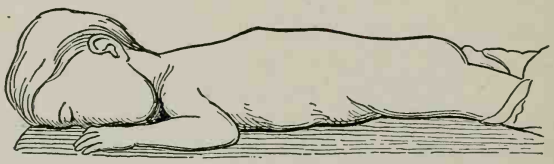

Fig. 13.—Humpback in early stage, showing sharp projection in back bone.

Lateral curvature of the spine is capable of causing the most frightful deformity if it becomes marked, although, considering its frequency, this does not often

occur. It also gives rise to pain in the back as a common symptom.

The ordinary humpback (Figs. 13, 14) is, of course, not due to the subject's weakness and slovenliness, and is generally much more marked than in round shoulders or stoop-back. The distinction between the two is that in humpback the projection in the back is sharp in the beginning, owing to tuberculosis of one or more vertebræ, and the back is painful and stiff on movement, and pains are felt in the abdomen. In the course of time the deformity becomes much greater than in round shoulders, although there are some cases which at first sight look like humpback, but the history of the case and lack of pain and stiffness in round-back will serve to distinguish it from humpback.

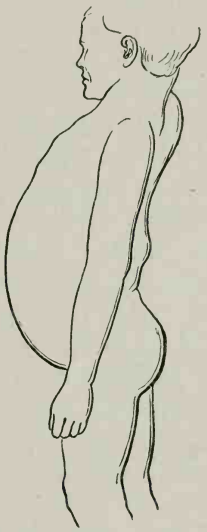

Fig. 14.—Humpback, showing distinct bony projection from the spine.

Prevention of back deformities must begin in infancy by the use of proper diet, and by giving the child proper care generally, to avoid such conditions as malnutrition, anemia, rickets, and scurvy, in which the soft tissues become weakened (muscles and ligaments) and the bones soft.

Mothers will find such a book as "Holt's Care of the Baby" invaluable in this connection. Tuberculosis in children is the commonest cause of bone diseases and may be avoided by the exclusive use of properly pasteurized milk (see page 287) in many cases. It is still more im-

portant to prevent exposure of a child to a tuberculous patient in the home. This matter has been discussed under Tuberculosis. Other common causes of joint and bone diseases are syphilis and gonorrhea, described elsewhere. Infantile paralysis is usually followed by deformities and must be avoided if possible (see page 141). As round-back and lateral curvature of the spine are due in large part to general weakness, the encouragement of the general development and vigor are of prime importance by means of proper physical training, games, and sports. In school the child should sit in proper position at an appropriate desk. The narrow chair with straight back at right angles with its seat, having an adjustable cross-piece to support the small of the back of the pupil, has been found most suitable. The pupil should not carry heavy books to and from school, as one-sided postures in standing, sitting, working, and playing all tend to produce lateral curvature of the spine. Nurse girls who carry a baby under one arm, or grocers' boys laden down with provisions, often show marked deformity of the spine in consequence.

The same remark applies to young persons in factories. At school frequent recesses give the pupils fresh air and change of position. Children should be made to stand with the head up, as if they were being measured and were trying to make themselves as tall as possible without actually standing on tiptoes (Goldthwait). This position throws the chest up and out and draws the shoulders back and the lower part of the belly in. The feet should be held straight, and toeing out must not be allowed. Weak feet, ankles, and legs will often cause a one-sided posture, as in this case one leg may be a little shorter than its fellow and lateral curvature of the spine will result. Astigmatism and deafness may

cause the pupil to hold his head on one side (thus favoring lateral curvature) in trying to see and hear, and these must be corrected—astigmatism by glasses, and deafness often by removal of enlarged tonsils and adenoid growths. These diseases also greatly reduce the vitality and general health. Their surgical cure is, therefore, imperative. Certain sports are particularly good in the prevention of deformities caused by round-back or lateral curvature. Thus, swimming with the breast-stroke (not side-stroke), riding astride, running and climbing, baseball, cricket, and football are desirable. Where there is a tendency to lateral curvature, side saddle riding, tennis, and golf may be inadvisable, although I have known golf to cure lateral curvature by its general effect in toning up the body through the invigorating outdoor exercise.

The patient in this instance was a delicate, nervous girl, the more common type of patient with this deformity. Dress is most important in young children. Straps holding up the clothing should always be made to bear on the shoulders next the neck, as do men's suspenders, and not be placed so that they pass over the outer part of the shoulders. This position of the straps tends to cause the shoulders to droop and induces round shoulders (Goldthwait).

Instruction in singing is much to be preferred to lessons in instrumental music where the positions are bad (as in playing the violin or piano). In singing the subject must stand erect and learn how to breathe properly and lift and fill the chest with air.

Round-back is part and parcel of general weakness, as shown by weak ankles and turned out feet (see Figs. 17, 18), and increasing the vigor of the body by exercises, alternated with proper rest (the use of a low pillow at night or none), is more important than braces or back supports,

although these have occasionally to be used. Consideration of the actual treatment of the deformities resulting from round-back or lateral curvature of the spine is out of our province, but it consists chiefly in well-directed exercises and occasionally (in lateral curvature) in the use of special apparatus and even plaster casts. This treatment may best be undertaken by the orthopedic surgeon.

KNOCK-KNEES AND BOW-LEGS

Both these conditions (Figs. 15, 16) are due to general weakness or disease of the bones, particularly rickets.

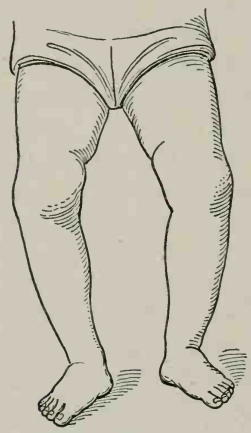

Fig. 15.—Bow-legs (after Taylor).

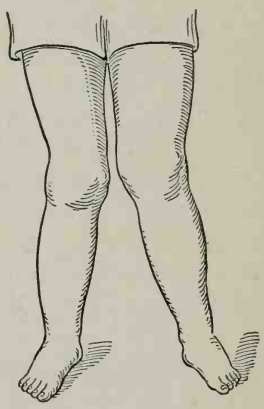

Fig. 16.—Knock-knees (after Taylor).

They are common deformities of young children. In knock-knees there is weakness of the knees owing to the stretching of the ligaments on the inside of the knees. Carrying heavy weights and standing too much may bring on knock-knee in older children. The feet are naturally

weak and turned out (see page 326) unless they are purposely carried straight or turned in to counteract the weakness in the knees. The gait is awkward and the knees may knock together in walking. The deformity is due either to a bending of the lower part of the thigh bone or the upper end of the chief bone of the leg, or both. Only one leg may be involved, but more often both legs. Occasionally one limb may have the bow-leg and the other the knock-knee deformity. In bow-legs the deformity commonly occurs below the knees in the chief leg bone (tibia), although the thigh bones may also be bent out of line.

Prevention and Treatment.—Children with rickets should be under treatment for some months before they are permitted to stand. When the condition of knock-knees is not pronounced, so that the distance between the ankles in standing is not greater than 2 inches, the deformity may be corrected by making the inside of the sole of the shoe $\frac{1}{4}$ inch thicker, so as to throw the weight on the outer side of the foot and take the strain off the inner border of the foot and the weak, inner side of the knees. In conspicuous cases of knock-knees or bow-legs braces should be applied by an orthopedic surgeon in the case of children under four who are walking. In severe cases operation is necessary in either knock-knees or bow-legs affecting children over four years of age. This consists in surgically breaking the deformed bones under an anesthetic and then setting the bones in proper position in a plaster-of-Paris cast. The operation is practically without danger. If the operation is done too early, as under four years, the deformity may recur.

WEAK FOOT AND FLAT-FOOT

These conditions are often seen in young children, as well as in adults who stand at their work, and should be

corrected in their earlier stages before actual deformity occurs.

In weak ankles there is usually a tendency to flat-feet. In standing, the characteristics of weak ankles are most apparent. These consist in prominence of the bones on the inside of the ankles, as seen in Fig. 17. Moreover, the subject stands with the feet held apart and the toes well turned out, as in Fig. 18. It was not so long ago that children

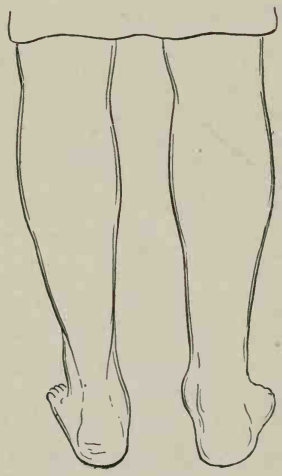

Fig. 17.

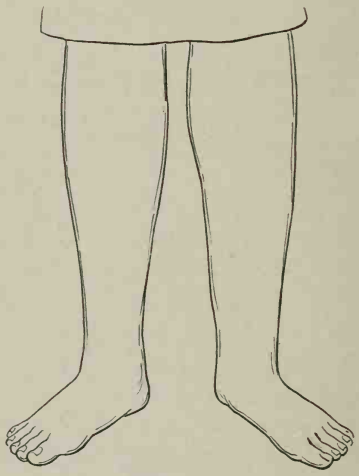

Fig. 18.

were taught to turn their toes out in walking, and they were being continually corrected for failure to assume this position.

The feet should be held in a straight line, neither toeing out or in while walking, although the slightly toeing in position is better than toeing out.

Both weak ankles and flat-foot are caused by weakness of the ligaments and muscles of the foot. In weak ankles

the weight tends to fall on the inside of the foot, as in Fig. 19, so that the arch of the foot gives way on the inner side and the entire sole of the foot rests on the floor. This is called flat-foot. Ordinarily only the outer half of the foot touches the floor in walking (Fig. 20). To determine the presence of flat-foot the soles of the feet may be smeared with vaselin, and then the patient may stand upon blotting paper to leave the impression of the feet; or, the soles of

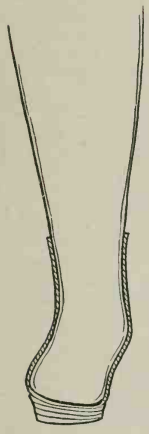

Fig. 19.—Foot seen from behind.

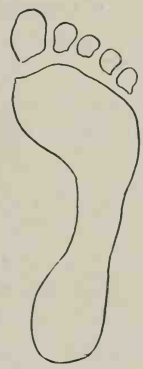

Fig. 20.

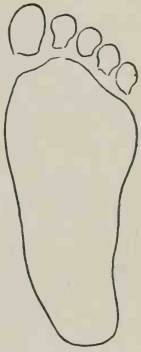

Fig. 21.

the feet may be brushed over with charcoal and the subject may stand upon white paper. In Fig. 20 is seen the impression of a normal foot, while in Fig. 21 is shown an impression of a very marked case of flat-foot. In adults who develop flat-feet because their occupation requires them to be on their feet continually, as in the case of nurses, policemen, etc., there is often great discomfort or pain. This condition is commonly thought to be rheumatism.

There may be pain and tenderness under the sole of the feet, about the ankles, under the heel, or under the outer ankle bone, and even in the calves of the legs, knees, thighs, hips, or back. Persons who stand much and have flat-feet and pain in the knees, hips, or back are often treated for rheumatism, or, if women, for womb trouble.

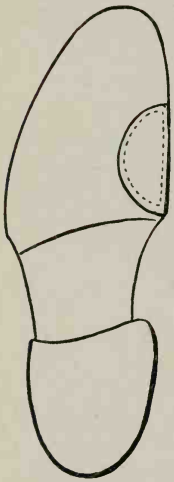

Fig. 22.

On looking at the shoes of persons with weak ankles and flat-feet it will be seen that there is unusual wear on the inner edge of the soles, owing to the weight bearing chiefly on the inside of the feet (see Fig. 19). As we are dealing in prevention, it is not within our province to consider treatment of chronic and bad cases of flat-feet which often need forcible correction of the deformity by a surgeon and rest in bed with the feet in a plaster cast. Even marked cases of flat-feet, which require plates to hold up the inner side of the soles of the feet, should go to the orthopedic surgeon for the fitting of plates rather than consult the shoe man, who will supply the ready-made articles so commonly worn. To prevent flat-foot in the case of weak ankles and feet in children and adults who stand at their work the following advice may be given:

In the first place the proper shoe should be worn. Such a shoe as is shown in Fig. 22 is of service and is often sold under the name of anatomic or orthopedic shoe. The sole forms a straight line on the inside of the shoe, so that the patient may have more bearing on the part where the greater weight comes, and the heel of the shoe is extended forward and inward for the same reason. This feature in

the heel is a counterpart of the great toe in the barefoot savage which spreads out, or really in—that is, away from the outside of the foot—and prevents the foot and ankle from giving away as in weak ankle. Straight-foot walking and standing should then be practised. The raising of the inner side of the sole of the shoe throws the weight of the body more on the outer side of the foot, and this is sometimes accomplished by an added sole piece about $\frac{3}{16}$ inch thick (see Fig. 22), or by making the whole sole this much thicker along its inner border.

Exercises in bare or stockinged feet are also essential. The following are recommended:

(1) Walk about the room three to five minutes with the toes pointing inward and the heels slightly raised from the ground (on tiptoes).

(2) With the toes turned in walk on the outer border of the feet three to five minutes.

(3) Stand with the toes turned in, quickly raise the heels, and slowly come down on the outer borders of the feet (three to five minutes).

(4) While standing, rise on the toes, turn the heels outward; lower the heels slowly to the floor.

The trained masseuse will also be of much service to children in manipulating the feet. Children should have times for rest and should practice walking straight-footed and on the borders of their feet with their shoes on. Bathing the feet with hot and cold water alternately for five minutes, followed by vigorous rubbing, will strengthen the muscles.

If the general tone is low the improvement in the general condition will have a correspondingly beneficial effect upon the condition of the feet.

CHAPTER XVIII

PREVENTION OF INFECTION AND BLEEDING IN WOUNDS

Sterilization with Iodin, Inflammation, Sterilization by Washing. To Prevent Lockjaw. Special Wounds. Bullet Wounds. To Stop Bleeding.

THERE are two methods in vogue to prevent the occurrence of inflammation or infection in wounds. The first is most recent and simple.

Sterilization of Wounds with Iodin.—This is applicable in wounds and cuts of all kinds where there is not so much bleeding as to demand its immediate arrest.

Apply to the wound itself and to the skin immediately surrounding it the pure tincture of iodin by means of a small piece of absorbent cotton wound about the end of a stick, match, or toothpick. The iodin should be freely applied so as to cover every part of the raw tissue. Wait a few minutes until the iodin is dry on the skin and then apply an absolutely clean or sterile dressing and bandage. If sterile gauze is not at hand, one may use cotton cloth which has first been boiled in water for five minutes. A dry dressing is better, however. In placing the sterile gauze or cotton over the wound one should not allow one's fingers to touch the part of the dressing that will come in contact with the wound. In small cuts which require no covering iodin is ideal for treatment.

No water should be applied to a wound before using iodin, because then the iodin will not penetrate into the tissues and kill germs. When the skin is very dirty or

greasy about the wound it is well to wipe it off with alcohol or benzin, while protecting the wound by covering it with a bit of sterile absorbent cotton or sterile gauze before applying the iodin. Then when the skin is dry apply the iodin to the wound and surrounding skin. If there are pieces of clothing, hair, splinters, or glass, etc., in the wound, these should first be picked out with forceps or hatpin before applying the iodin.

Tincture of iodin is the most valuable first-aid treatment for all wounds, and should be kept on hand wherever surgical accidents are likely to occur. Some smarting is produced by the application of iodin to fresh wounds, but this is temporary and not severe. In a recent book by the present Medical Inspector General, Delorme, of the French Army (1915), the author states in italics, "Tincture of iodin is at present the best and safest disinfectant to make use of in the practice of war surgery, both in the fighting line and in the rear." It is sometimes inconvenient for individuals to carry about on their persons a liquid like the tincture of iodin, so that ointments and powders may be substituted for the prevention and treatment of wound infections.

Recent experiments in this country indicate that an ointment containing 10 per cent. each of tricresol and thymol may be safely used to the extent of a dram (or teaspoonful) on a wound, and will prove as effective as tincture of iodin in preventing infection. The bulk or base of the ointment consists of castor oil, 70 per cent.; white wax, 20 per cent.; and spermaceti, 10 per cent.

Clean wounds, like cuts made by a surgeon, will heal at once without the formation of pus or inflammation, providing cut surfaces are brought together and the wound is not too much torn or bruised. A single dressing is all that is required in such cases, and it is always advisable

for the layman to leave the first dressing untouched until the wound may be seen by a surgeon, even if a week or more elapse, if there is no fever, great pain, or certain signs of inflammation.

In place of stitches the layman can more readily use surgeon's adhesive plaster to close wounds. Strips of plaster $\frac{1}{3}$ inch wide and long enough to obtain a good hold on the skin (perhaps 2 inches on each side of the wound) should be laid at intervals of $\frac{1}{2}$ inch across the wound. The ends are firmly pressed down on one side of the wound, and while the edges of the wound are pinched together the free ends of the plaster are drawn tightly across the wound and pressed firmly down on the skin beyond. Strips of plaster should never completely encircle a limb or the circulation will be impeded. Large wounds should only be closed in part, leaving an inch or so for drainage. Small punctured wounds should not be closed at all, but after swabbing them deeply with iodin, a strip of sterile gauze or boiled cotton coth should be pushed to the very bottom (by a boiled hairpin) to secure drainage before covering the wound with dressing.

Inflammation.—When there is much redness, swelling, pain, and heat about a wound it is best to apply a moist dressing until inflammation subsides. Soak sterile gauze (or boiled cheese-cloth) in boiling water containing as much boric acid as will dissolve. When sufficiently cool wring the water out of the gauze slightly with the clean hands, being careful not to touch the part of the gauze which will come in contact with the wound. Cover the wound over a large area with the dressing an inch thick, and then on this lay a piece of oiled silk or rubber cloth and enclose the whole with a bandage. Such a dressing is an absolutely harmless antiseptic poultice and will remain moist for twenty-four hours, when it may be replaced.

Sterilization of Wounds by Washing.—The older method consists in washing wounds for fifteen minutes or so until all dirt and germs are removed. This is an efficient treatment, but requires some knowledge and skill to perform properly. Antiseptic solutions are often used, but water to which salt is added (1 level teaspoonful to the pint) and that has been boiled five minutes and allowed to cool sufficiently, is just about as efficacious. Pouring the water warm from a clean pitcher in a small stream upon the wound is one of the best methods, as one does not convey any germs to the wound with the hands.

If there is much bleeding, water should be used as hot as can be borne. If the skin is very dirty surrounding the wound cover the wound first with a piece of sterile gauze or boiled cotton cloth to protect it, and then wash the skin thoroughly with soap and water, and finally with alcohol diluted one-third with water. If there is much hair about the wound, as on the head, this must also be cut or shaved off for about an inch around the wound. The more thorough or, in other words, the longer the washing is conducted (from ten to twenty minutes), the better will be the result. In case it is necessary to remove some dirt or clots that cannot be washed off, one may boil some pieces of absorbent cotton or old cotton cloth for five minutes, and after washing one's hands for the same length of time may bathe the wound and rub off the dirt or clots with these as sponges. Then the wound should be covered with dry sterile gauze or, lacking this, wet cotton cloth after boiling it for five minutes. The part of the sterile gauze, or boiled cotton cloth, which will touch the wound should not first come in contact with the fingers.

To Prevent Lockjaw.—Punctured wounds of the hands or feet soiled with street or stable dirt are especially liable to lockjaw unless properly handled. Any wounds much

bruised or torn are also more subject to this infection. The reader is referred to page 96 for means of absolutely preventing this fearful complication.

Special Wounds.—In deeply cut wounds of the hands it is not sufficient that the wound be closed by stitches, but nerves and tendons must be properly united or some of the fingers may be useless. This is work for an able surgeon and the general practitioner not infrequently fails to secure good results in these cases. Ragged, bruised wounds should be swabbed with iodin and left open to a considerable extent for drainage.

Punctured wounds made by nails, splinters, knives, and teeth of animals are among the most difficult for the layman to treat properly, even in the way of a first dressing. Unless made by a small, very clean body, as a needle, such wounds must be swabbed to the bottom with iodin and kept open by stuffing in strands of string or cotton cloth which have been boiled five minutes. Iodin may be applied by means of a little absorbent cotton wound on a toothpick. The toothpick should be wet before twisting the cotton about it to keep the cotton from coming off in the wound.

Punctured wounds so small that one cannot swab them out with iodin, as from nails or bullets, are those which especially demand immediate surgical attention because germs become sealed in the wound and inflammation and lockjaw may result (see page 96). The moist, antiseptic dressing, described under Inflammation, is often best for punctured wounds. Scalp wounds frequently bleed freely. The bleeding may be stopped by pouring water as hot as can be borne over the wound and by covering the wound with a pad of sterile gauze or boiled cotton cloth and holding it very tightly by a bandage about the head. Iodin is the best agent to apply when bleeding has

stopped. The hair should be cut off for 2 inches about the wound, which may be closed by adhesive plaster (see above) and covered with dry sterile gauze and bandage.

Bullet Wounds.—Clothing should be cut away about the wound and the wound and skin (for 2 inches around the wound) should be painted with tincture of iodin. As soon as the iodin is dry a pad of at least an inch in thickness should be bandaged snugly over the wound. The pad had best consist of sterile gauze, but in its absence, old cotton cloth which has been boiled five minutes or sterile absorbent cotton may be used. The patient should be kept absolutely quiet in bed, as shock is common.

If a limb is wounded it is well to apply some sort of a splint made of thin board, padded with folded sheets, to keep the wound at absolute rest.

Shock is shown by pallor, cold hands and feet, and weak, rapid pulse. The patient should be given 4 tablespoonfuls of whisky in an equal amount of hot water and be surrounded by hot-water bags.

Probing for bullets should never be undertaken by the layman and is usually undesirable on account of the danger of pushing germs into the wound. The *x*-ray is employed to locate bullets. Bullets are sterilized to some extent by the scraping they get and the heat generated in the weapon, but if they carry any clothing into the wound inflammation is almost sure to result.

Where a bullet passes through the body the wound of exit is usually larger and more ragged than the wound of entrance. If a person is hit by a charge of shot from a shot-gun at close range a dreadful wound is produced. Bleeding must be stopped (see below), the cavity thoroughly swabbed with iodin, and packed loosely with sterile gauze or boiled cotton cloth, and covered with a thick pad of the same and bandage. Bullet wounds of the head,

chest, and abdomen are naturally the most serious and demand instant surgical attendance.

To Stop Bleeding.—Keep cool. An adult may lose 1 to 2 pints of blood without danger.

When Bright Red Blood is Flowing in Spurts.—Place the patient on his back and make firm pressure with both thumbs into the flesh just above the wound, that is, nearest the body. An assistant should then tie a tight bandage about the limb between the wound and the body—an elastic pair of suspenders or (best) a piece of rubber tubing. Or a rope or strap may be fastened tightly over a folded towel, to prevent injury of the skin. A folded towel or handkerchief may be twisted tightly about the limb with a stick. A pad of sterile gauze, rounded stone, or cork, under the bandage and over the wound, may help to plug the opening. A tight bandage (or tourniquet) may be kept on a limb for an hour without doing serious damage to the tissues. A bleeding arm or leg should always be held well up in the air resting upon some extemporized support. Spurting blood comes from an artery.

To Stop Steady Flow of Dark Blood.—Make firm pressure with a pad of sterile gauze, or absorbent cotton, or clean handkerchief wet with alcohol, directly over the wound. This may be held in place with a tight bandage. Raise the limb on a support. If the flow of blood is large tie a tight bandage about the limb below the wound, that is, farthest from the body. This may be removed in half an hour. Steady flow of dark blood comes from a vein bringing blood toward the body and heart. Spurts of bright red blood come from an artery bringing blood away from the body and heart.

To Stop Constant Oozing of Blood.—This means that small vessels are cut, and bleeding may be expected to stop through clotting of blood and contraction of the cut

ends of the vessels. If it persists, pouring water as hot as can be borne upon the wound may stop the bleeding, or constant pressure made on a pad of sterile gauze, absorbent cotton, or folded handkerchief wet in alcohol will arrest it.

Ice-water at hand may be used in place of hot water, although the latter is preferable. The bleeding limb should be elevated.

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